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Some Rules of Data Presentation [1]

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Most statistical tables are badly presented, requiring much effort even from sophisticated users. It is as if their producers either did not know what the data were saying or were not letting on. Some precepts for improved data presentation are discussed in this article.

The criterion for a good table is that the patterns and exceptions should be obvious at a glance, at least once one knows what they are, but most tables are not like that.

To illustrate, table 1 gives an extract of data on U.S. unemployed from table 572 in the *Statistical Abstract of the United States* for 1975.

Table 1 may at first appear reasonably well laid out, but in forming this view one has probably looked only at the captions. The numbers themselves are not as easy to take in. What are the main patterns? How can they be summarized? How can one tell someone over the phone? What is one likely to absorb or remember?

Looked at with these questions in mind table 1 now appears more like an undigested jumble of numbers. Table 2 gives an improved presentation of the same data.

It is now easier to see the major patterns and exceptions, for example:

(a) The numbers of unemployed decrease with the size of the population, but Connecticut and D.C. appear high (though in D.C. the percentages of the work force imply a different conclusion).

[1] Derived from the author's "Rudiments of Numeracy," presented to the Royal Statistical Society in London on March 2, 1977 (*J. Royal Statist. Soc. A*, 140, in press) and from his text *Data Reduction: The Analysis and Interpretation of Statistical Data* (New York: John Wiley, 1975). Camera-ready copy of tables in this article were provided by the author.

TABLE 1 Total and Insured Unemployed – States: 1971–1974
(The first 15 states from Table No. 572 of *Statistical Abstracts* 1975).

STATE	TOTAL UNEMPLOYED [1]								INSURED UNEMPLOYED					
	Number (1,000)				Percent [2]				Number (1,000)			Percent [3]		
	1971	1972	1973	1974	1971	1972	1973	1974	1972	1973	1974	1972	1973	1974
Ala	75.0	62.0	62.0	78.0	5.5	4.5	4.5	5.5	20.7	16.9	26.5	2.9	2.0	2.9
Alaska	12.1	12.9	13.9	14.7	10.5	10.5	10.8	10.5	5.6	5.7	6.1	9.5	8.6	8.6
Ariz	32.8	32.0	34.0	49.2	4.7	4.2	4.1	5.6	9.7	10.1	19.1	2.3	1.9	3.3
Ark	40.1	36.1	33.5	39.8	5.4	4.6	4.1	4.8	12.9	12.0	17.8	3.1	2.5	3.5
Calif	737.0	652.0	615.0	670.0	8.8	7.6	7.0	7.3	242.3	228.0	277.8	4.7	3.9	14.3
Colo	36.7	35.2	36.0	42.8	4.0	3.6	3.4	3.9	7.0	7.6	12.1	1.3	1.2	1.6
Conn	116.0	121.0	89.0	88.0	8.4	8.6	6.3	6.1	48.9	36.3	49.3	4.5	3.2	4.0
Del	13.3	11.4	11.6	15.3	5.7	4.7	4.6	6.1	4.3	4.0	6.8	2.5	2.0	3.1
D.C.	34.0	44.0	59.0	62.0	2.7	3.3	4.2	4.4	7.0	7.0	8.5	2.0	1.9	2.3
Fla	135.0	127.0	132.0	208.0	4.9	4.5	4.3	6.3	30.7	27.7	55.7	1.9	1.3	2.4
Ga	76.0	83.0	81.0	109.0	3.9	4.1	3.9	5.1	18.3	15.1	31.5	1.6	1.1	2.2
Hawaii	20.6	24.7	23.9	27.2	6.3	7.3	7.0	7.6	11.2	10.5	12.4	4.1	3.8	4.1
Idaho	19.4	19.9	19.1	21.5	6.3	6.2	5.6	6.1	6.7	6.6	8.1	4.2	3.5	4.0
Ill	240.0	245.0	203.0	223.0	5.1	5.1	4.1	4.5	87.3	68.4	90.9	2.8	1.9	2.4
Ind	128.0	103.0	101.0	123.0	5.7	4.5	4.3	5.2	30.0	21.8	41.8	2.2	1.4	2.5

[1]
[2] Data for years prior to 1974 may not be entirely comparable,
[3] Total unemployment as percent of total work force,
Insured unemployment as percent of average covered employment.

TABLE 2 "Improved" Version of Table 1

(States in order of 1970 population, figures rounded, fewer vertical rules, column averages)

STATES (in order of 1970 pop.)	Total Unemployed								Insured Unemployed					
	In '000				as % of work force				In '000			as % of covered		
	'71	'72	'73	'74	'71	'72	'73	'74	'72	'73	'74	'72	'73	'74
California	740	650	610	670	9	8	7	7	240	230	280	5	4	4
Illinois	240	250	200	220	5	5	4	5	87	68	91	3	2	2
Florida	130	120	130	210	5	5	4	6	30	28	56	2	1	2
Indiana	130	100	100	120	6	5	4	5	30	22	42	2	1	3
Georgia	76	83	81	110	4	4	4	5	28	15	32	2	1	2
Alabama	75	62	62	78	6	5	5	6	21	17	27	3	2	3
Connect.	120	120	90	90	8	9	6	6	49	36	49	5	3	4
Colorado	37	35	36	43	4	4	3	4	7	8	12	1	1	2
Arkansas	40	36	34	40	5	5	4	5	13	12	18	3	3	4
Arizona	33	32	34	49	5	4	4	6	10	10	19	2	2	3
Hawaii	21	25	24	27	6	7	7	8	11	11	12	4	4	4
D.C.	34	44	59	62	3	3	4	4	7	7	9	2	2	2
Idaho	19	20	19	22	6	6	6	6	7	7	8	4	4	4
Delaware	13	11	12	15	6	5	5	6	4	4	7	3	2	1
Alaska	12	13	14	15	11	11	11	11	6	6	6	10	9	9
Average *	110	110	100	120	6	6	5	6	36	32	44	3	3	3

*For the 15 States

(b) On average the numbers of unemployed varied only by plus or minus 10% over the four years, but increased by 50% or more in Florida, Georgia, Arizona and D.C. and decreased by 25% in Connecticut.

(c) The *insured* unemployed look high in Connecticut and low in Colorado.

(d) Expressed as a percent of the work force or those covered by insurance, the figures vary greatly from state to state, but appear uncorrelated with the *size* of the state.

These are the more obvious features of the data, but they do not seem as clear in table 1 even now that we know what to look for. The original table therefore fails both the strong and the weak versions of the criterion for a good table, while table 2 certainly passes the weak version even if not entirely the strong one:

The Strong Criterion for a Good Table: The patterns and exceptions should be obvious at a glance.

The Weak Criterion: The patterns and exceptions in a table should be obvious at a glance once one has been told what they are.

The strong criterion may sound fine, but really only says that the naive newcomer should gain instant insight, unaided. The weak version is in fact much the more important one. It applies automatically to all situations which are repetitive, that is, where the probable pattern of the new data is already known beforehand. It applies to the experienced user and it can cover more complex tables if a commentary is given.

A common doubt about trying to improve the lay-out of tables is whether it should not vary with the particular use that is to be made of the data. An "improved" version like table 2 is easier for virtually *any* purpose than the original table 1. The data might perhaps be displayed in a way even more suited to some specific purpose, but that would merely mean taking the procedures of this paper yet further.

Four Basic Rules

The table improvement just illustrated involved a combination of factors, but these can be considered separately, and I now discuss four major rules or guidelines. They concern rounding, the use of marginal averages, choosing between rows and columns in a table, and ordering the rows or columns.

To illustrate I use an example concerning the level of unemployment in Great Britain over 4 selected years, as reproduced in table 3 from *Facts in Focus,* a statistical paperback comparable to the *Pocket Data Book, U.S.A.*

TABLE 3 Unemployment in Great Britain — Original Table

(thousands)	1966	1968	1970	1973
Total unemployed	330.9	549.4	582.2	597.9
Males	259.6	460.7	495.3	499.4
Females	71.3	88.8	86.9	98.5

The table is small and simple (chosen for conciseness of exposition here), but the numerical

details are once more not obvious at a glance. Suppose we look away. What do we remember having seen, *without looking back*? What can we say about the numbers of unemployed?

RULE 1: ROUNDING TO TWO SIGNIFICANT DIGITS

Understanding any set of numbers involves relating the different numbers to each other. In table 3 this is not easy. For example, mentally subtracting the 1966 total from the 1973 total and remembering the answer is relatively difficult (330.9 from 597.9 = 267.0). Taking ratios mentally (330.9 *into* 597.9) is virtually impossible. Most of us can do such mental arithmetic only by first rounding the figures to one or two digits in our heads.

In table 4 this rounding has been done for the reader. The general rule is to round to two variable or significant digits, where "variable" or "significant" here means digits which vary in that kind of data. (Final 0's do not matter as the eye can readily filter them out.)

TABLE 4 Unemployed in GB – Rounded

000's	1966	'68	'70	'73
Total unemployed	330	550	580	600
Males	260	460	500	500
Females	71	89	87	99

Now we can see that the difference between 330 and 600 for total unemployed is 270, and that 330 *into* 600 is almost 2, that is, an increase of almost 100%. We can also see that the increase for males from 260 to 500 is again nearly 100%, and that the corresponding increase for females from 71 to 99 is about 40% (i.e. 28 out of 71). Total unemployed up by almost 100%, males up by almost 100%, and females up by less than 50%: that is something one *can* remember. It is also easier to recall that the range for total unemployed is from about 330 to 600 than that it is from 330.9 to 597.9.

The male and female numbers have been reduced to the nearest ten thousand and the nearest thousand respectively, by being rounded to two significant digits *in their own context*. This avoids overrounding when different groups of figures vary greatly in size. A side effect is that the figures do not add up exactly. This is an undoubted nuisance, but a lesser one than the perceptual difficulties of the unrounded data in table 3. Anyone who cannot learn to cope with rounding errors will probably not get much out of statistical data anyway.

Any comparable assessment of the figures in table 3 would in any case require mental rounding. (Pocket calculators are not the answer since knowing that 597.9/330.9 = 1.8069 does not greatly help us to see and absorb the patterns in the table.) For better or for worse, drastic rounding is necessary if we are to see and internalize the data.

Rounding tends, however, to raise heated objections. It is accepted in graphical presentations, and most people would not object much to reducing statistical data to *three or four* significant digits, but they often feel that rounding to only two significant or variable digits is overdoing it.

Unfortunately such rounding is necessary to facilitate mental arithmetic. For example, almost none of us can divide 17.9% into 35.2% in our heads (most percentages are mistakenly reported as "per mille" rather than as "per centum"). Of several thousand people asked to do this division over the years only two mathematicians at Purdue have claimed success, but since they got different answers at least one of them was wrong. In contrast, dividing 18% into 35% is obviously about 2. Thus two digits are better.

Instead of asking "Can these data be rounded to two digits?", we need only to check why they should *not* be rounded. A safeguard is that no information need ever be completely lost by rounding: The more precise data can always be stored in a data bank or filing cabinet just in case somebody somewhere should want them sometime. Will the more precise data in fact ever be used? When would the unemployment figures be needed to the nearest 100 people as in table 3, rather than rounded to the nearest 1,000 or 10,000?

The average error in rounding the female unemployed to two digits is 300. This is trivial compared with the overall increase of almost 30,000 in the female figures and with the contrary drop of about 2,000 from 1968 to 1970.

The rounding errors are also trivial in contemplating a fuller analysis of unemployment. This would not mean digging deeper into the eight selected readings in table 3, but taking account of vastly *more* data: unemployment figures for other years, in different regions of the country, different industries, different age

groups (with school-leavers and college students treated separately), *plus* figures for employment, reported vacancies, inflation, investment, stockpiling, dumping, gross national product, the money supply, birth rates, immigration, mechanization, business cycles, world trade, unemployment in other countries, and so on, as well as intensive comparisons of figures based on different definitions and measuring procedures.

Each monthly issue of the *Department of Employment Gazette* in the United Kingdom gives about 8,000 two-to-four digit numbers on unemployment alone, and each monthly issue of *Employment and Earnings* in the United States gives several thousand more. Most of the figures may be the same as in the previous month, but the need to see the wood for the trees becomes even more urgent than with the eight basic figures in table 3. Hoping to explain variation to the third digit (i.e. less than 1%) becomes even more absurd.

People who object to rounding to two significant digits because they feel that "there may be something there" can have had no experience of *successfully* analyzing and understanding statistical data.

RULE 2: ROW AND COLUMN AVERAGES

The second rule concerns the use of row and column averages.These can provide a visual focus and sometimes also a possible summary of the data. Table 5 illustrates this by giving the row averages across the 4 years. (The column totals already in this table serve almost the same purpose as column averages, but are best separated off with a half space.)

TABLE 5 With Averages

000's	1966	'68	'70	'73	Ave.
Total unemployed	330	550	580	600	520
Male	260	460	500	500	430
Female	71	89	87	99	86

Even with a small table such averages prove useful. Noting that the average male/female ratio is 5 to 1 (i.e. 430/86) and keeping this one figure in mind, we can see more readily how the ratio varies over the years, from less than 4 to 1 in 1966 to just over 5 to 1 in each of the 3 later years.

The use of such averages is often misunderstood, especially by those who wrongly fear that "others" (meaning the statistically less sophisticated) will be misled. In Table 5 it is obvious that the averages are not "typical" of the figures in each row—the 1966 figures are much lower. In fact, the point of the averages is to make it that much easier to grasp the spread between the below-average and above-average values.

RULE 3: FIGURES ARE EASIER TO COMPARE IN COLUMNS

Figures are generally easier to follow reading down a column than across a row. Even for our small example here it is easier to see in table 6 that all the numbers were substantially lower in 1966 than in the 3 later years.

TABLE 6 Rows and Columns Interchanged

GB	Unemployed (000's)		
	Total	Male	Female
1966	330	260	71
'68	550	460	89
'70	580	500	87
'73	600	500	99
Average	520	430	86

We also notice minor variations and subpatterns more, for example, that contrary to the total trend, the female figures leveled off only for 1968 and 1970 (in fact dropping slightly in the latter year), the 1973 figure of 99 indeed being markedly high. Compared with table 5 we are beginning to see more of the data.

The improvement is a perceptual one. To see in table 5 that the main variation for total unemployed is from roughly three hundred to six hundred, the eye first had to take in and then partially ignore all the symbols and gaps in the sequence 330 550 580 600, average 520, and it had to travel relatively far to do so. In table 6, however, all the "hundreds" are one under the other, and hence much easier to scan (preferably starting with the average and keeping that in mind as a norm). The eye can run up and down the first digit in each column and more or less ignore the rest.

A common query about changing rows into columns is, however, whether all users of the table will want to compare the figures in the columns rather than those in the rows. In prac-

tice one must always do *both*. The main pattern in the data should be looked at first, and hence in columns because that is easier. Then, having seen the main pattern, one can look at the rows and for any row-and-column interactions.

Another query concerns fitting long row captions into column headings. With repetitive data this can often be done by abbreviation, by spreading the headings over two or three lines, and by relegating detail to footnotes. (People who object to having to look at the footnotes to a table are probably not the sort that would get much out of a complex-looking table anyway.)

RULE 4: ORDERING THE ROWS AND COLUMNS BY SIZE

Ordering the rows and/or columns of a table by some measure of the size of the figures (e.g. their averages) often helps to bring order out of chaos. It means using the dimensions of the table to enable us to see the structure of the *data*, rather than merely reflecting that of the row or column labels (which is usually already well known, like that Arizona follows Alabama alphabetically).

The unemployment data in table 6 already have the rows in an effective order of size because the trends happen to coincide with the order of the years. To illustrate the rule, table 7 gives the data with the rows in another order, A to D. Even with such a small table it is now less easy to see that the figures in Row C (or 1966) are generally the smallest. Interactions are even harder to spot, for example, that the male figures in Rows B and D are identical at 500 while the female ones differ markedly at 87 and 99.

TABLE 7 Rows in Some Other Order

GB	Unemployed (000's)		
	Total	Male	Female
A	550	460	89
B	580	500	87
C	330	260	71
D	600	500	99
Average	520	430	86

One problem with ordering the rows or columns of a table by some measure of size is that different measures of size can be used, possibly resulting in different orders. Users of a table do not have to accept the chosen order as sacrosanct. One order will show up the conflict with another, and *some* visible ordering is always better than none, as in table 7 here or in the earlier table 1. In table 2 anyone could see that the Connecticut figures were out of step.

A nonalphabetical ordering is often criticized as making it difficult to look up the result for a particular state, but a statistical table is not a telephone directory. To use and interpret an isolated figure one must understand the context of the surrounding ones and see the general pattern of the data. If there are many such tables and they are large, an alphabetical key will also be worth giving. In any case it is probably easier to find an isolated name in a nonalphabetical listing (especially if the names are given in their visually most recognizable form) than to interpret an isolated number from an unstructured table.

A problem that arises when there are many different tables with the same basic format is that straight application of the rule could lead to different orders for different tables. In such cases the same order must be used in every table, based on some general order criterion (like the last census figures used in table 2).

A subsidiary question when ordering rows or columns by size is in which *direction* the figures ought to go. People differ in their predilections here. Some like to have figures running from large on the left (as in table 6), or from large at the top, while others prefer the opposite. With time series some like to have time progress from the left or the top of the tabulations, while others prefer to have the *latest* figures there. These views are usually not held very strongly, nor do they appear to have any marked perceptual consequences when ordering columns.

For the *rows* of a table, showing the larger numbers above the smaller numbers helps because we are used to doing mental subtraction that way. It is more difficult to subtract 380 from 640 in the form

380		640
640	than as	380

Facilitating such mental arithmetic is important, especially when one is scanning large sets of data.

Conclusions

The preceding discussion has illustrated four of the basic rules of data presentation—drastic rounding, the use of averages, putting figures that are to be compared into columns, and ordering rows and columns by size. On the whole, the presentation of numerical data to facilitate its use has been a relatively neglected area. Most statisticians have not realized how unnecessarily incomprehensible their supposedly competent tables usually are.

The practical problems of implementing such rules must, however, not be underestimated. Many of us are still unfamiliar with the techniques, or even with the fundamental notion that most tables can be improved so as to communicate better. There can also be very substantial setup and upset costs in changing from traditional practices, but these will generally be more than balanced by the savings in paper and printing, not to mention the fuller and better utilization of the data.

A Framework for Planning U.S. Federal Statistics, 1978—1989

(Draft Chapters)

ENERGY STATISTICS

Introduction and Overview

The need for information on energy derives largely from the recent energy crisis and OPEC oil embargo which made explicit our dependence on foreign sources of energy, principally oil. The Federal Energy Office, now the Federal Energy Administration, was established as the focal point for policy analysis and determination. The activities of the Atomic Energy Commission were reorganized, and the Energy Research and Development Administration was created to enhance our ability to develop new resources of energy and to conserve their use. Recently the President has proposed the creation of a Department of Energy which would combine the Federal Energy Administration, Energy Research and Development Administration, Federal Power Commission, and certain parts of the Department of the Interior such as the Bureau of Mines. In the President's April 20, 1977 address on energy made to a joint session of Congress, he specifically proposed improved collection of data on energy reserves and finances of the petroleum industry. He also stated that there is a need for an emergency energy data information system.

Major data needs stemming from this recent activity derive from a need to know more about the process of finding, supplying, processing, transporting, and using energy. These needs for data are more urgent now than before 1973, but were not unknown to the more established agencies before the embargo. The Department of the Interior has long had extensive knowledge of coal and oil reserves, resources, and production through the Bureau of Mines and the Geological Survey. The Bureau of the Census has collected data on energy exploration, production, and consumption through its surveys and censuses. The Federal Power Commission has regulated the interstate price of natural gas using data on reserves and production costs.

The new environment has led also to increased regulation of the energy industry including import fees, allocation of imported crude oil, price regulations, and other aspects of the energy industry. Information is needed to determine the need for regulation, to monitor its implementation and to evaluate its effect. As the regulatory activities increased, additional data requirements have been levied on the public.

It is especially difficult to organize and plan for a national data collection system when regulatory and statistical functions are so thoroughly interrelated. Regulatory data are frequently inflexible since the statute and regulation being

EDITOR'S NOTE

In previous issues of *Statistical Reporter* there have been several discussions of the planning process associated with preparing *A Framework for Planning U.S. Federal Statistics, 1978—1989*. The text of the Framework is in the process of being prepared and reviewed by the Federal statistical agencies. A revised draft will be the subject of public review and comment during 1977. Since this material is presented here in preliminary form, it should not be viewed as representing decisions concerning policy matters.

Selected drafts of various sections of the Framework will appear in *Statistical Reporter* during the coming months. While preliminary in nature, these drafts will be published in order to facilitate wide review of the materials. The following chapters are published in this issue: Energy Statistics; Education Statistics; Income, Wealth, and Consumption; and Social Indicators and Social Accounts. The following chapters have appeared in previous issues: Labor Statistics, Production and Distribution Statistics, Statistics on the Environment and on Occupational Health and Safety, Civil Rights Data, Professional Staffing and Professional Staff Training, and Interagency Funding (April 1977); Price Statistics (March 1977); Criminal Justice Statistics (February 1977); Confidentiality of Statistical and Research Data (January 1977); User Access—Data Banks (December 1976); Federal-State Cooperative Systems of Data Collection (November 1976); Long-Term Economic Growth Models (October 1976); Section I—The Nature of the Plan (September 1976). For a full outline of the overall Framework, see pages 207—209 of *Statistical Reporter* for May 1976.

For background statements on the planning process, see Joseph W. Duncan, "Developing Better Long-Range Plans for Federal Statistics," *Statistical Reporter*, October 1974; Robert W. Raynsford, "The Interagency Statistical Planning Effort, 1975," *Statistical Reporter*, September, 1975; and Paul O'Neil, "OMB's Role in Planning and Coordination of Federal Statistics," *Statistical Reporter*, May 1976.

Comments on these materials should be sent to the Statistical Policy Division, Office of Management and Budget, 726 Jackson Place, N.W., Washington, D.C. 20503.

implemented may be changed only by Congress or need for significant administrative action, and the collection of such data are difficult because the analytical and statistical information is not typically a high priority of the lawmakers or regulators. The Energy Conservation and Production Act of 1976 provides for the establishment of an Office of Energy Information and Analysis (OEIA) within FEA. The OEIA has responsibility for the National Energy Information System. In the Department of Energy proposed by the President, provision is made for an energy information administration. These recent legislative activities indicate a significant awareness on the part of Congress of the need for better data. In addition, statistical data are often collected on a voluntary confidential basis for a sample of respondents. Sample data simply are not acceptable for most regulatory programs, and confidentiality as the statisticians know it precludes most regulatory uses of statistical data. Hence, regulation often brings duplicate data collections which are difficult to consolidate with statistical data programs.

Related to the urgency of the concern for energy dependence is the development of energy programs and the concomitant need for information in almost every Department and agency. The Federal Reserve Board has an energy-related production index, the Bureau of Economic Analysis has an energy input-output project, the Department of Transportation deals with energy used in moving people and goods, the Environmental Protection Agency has automobile mileage tests and relates energy consumption to environmental concerns in other ways, the Bureau of Labor Statistics collects data on the retail price of gasoline, and this list could go on. The point is that interest in energy problems and solutions have sprung up in many places making it difficult to coordinate the various programs into one or even a few systems.

Interagency coordination, which has become very difficult in this context, is further hindered because the reports clearance function is split between the Office of Management and Budget and the General Accounting Office. In the energy area, many of the major agencies submit their proposed questionnaires to the General Accounting Office under the Federal Reports Act of 1942 as amended in 1973 by the Trans-Alaska Pipeline Authorization Act (44 U.S.C. 3501–3512), the most important of these agencies being the Federal Energy Administration and the Federal Power Commission. Other agencies, including the Bureau of Mines and Geological Survey in the Interior Department, the Census Bureau, and the Energy Research and Development Administration, submit their proposed forms to the Office of Management and Budget. Effective planning and coordination in most Federal statistical programs is enhanced by the coordinated use of the reports clearance authority in concert with other authorities, but this

is quite difficult for many energy surveys given the separation of clearance responsibilities.

Major Energy Information Agencies

There are many agencies collecting and using statistics about energy. Some of the major agencies are listed here with a brief description of their activities.

The Federal Energy Administration (FEA) is the main energy policymaking agency in the Federal Government. It is responsible for developing policy to ensure a high degree of independence from foreign energy sources and for regulating prices and supplies of energy. Conservation of energy is a major area of endeavor for this agency. FEA has basic data collection programs in supply and cost of energy, of prices, petroleum market shares and has collected data on reserves of oil and natural gas. FEA also has or is developing joint data collecting agreements with the Bureau of Mines (for petroleum and for coal), and with the Federal Power Commission, Interior, and Commerce (natural gas curtailments). This agency also has established or has under development, models (e.g., Project Independence) and data systems (e.g., consumption, national energy accounts) which require data inputs from other agencies as well as data collected by FEA. FEA coordinates much of the energy data with its National Energy Information Center and Federal Energy Information Locator System, and was the first agency to chair the Federal Interagency Council on Energy Information. FEA has mandatory powers of data collection including subpoena, and authority to conduct audits and other verification procedures. The Energy Conservation and Production Act of 1976 establishes the Office of Energy Information and Analysis within FEA which has the responsibility to establish, operate, and maintain a National Energy Information System (NEIS) and to coordinate Federal energy information.

Several agencies in the Department of the Interior are involved with significant energy data collection and use. The major ones are the Bureau of Mines and the U.S. Geological Survey.

The Bureau of Mines (BOM) collects data on reserves, production, distribution and consumption of coal, oil, and gas in their Fuels Availability System. BOM cooperates with the FEA as the collection agency for the recently established Integrated Petroleum Reporting System, and is negotiating a similar agreement on coal statistics. These data bases are quite flexible in their uses to answer policy questions and congressional inquiries. BOM also estimates market demand for coal, gas, and petroleum. Except for the joint programs with FEA, BOM collects data on a voluntary basis.

The U.S. Geological Survey has two main divisions which contribute information on energy. The Conservation Division has regulatory authority over leases on Federal lands, especially offshore. The Geologic Division needs information on reserves to facilitate estimation of resources, namely those deposits of oil and gas which are as yet undiscovered but which will be economical to produce when found.

The Bureau of the Census, Department of Commerce, traditionally the core of the U.S. Federal Statistical System, has collected data which directly or indirectly relate to energy. This is accomplished through many surveys including the quinquennial census of mineral industries, the annual survey of oil and gas, the annual survey of manufactures, and the foreign trade statistics program which relies on import documents of the U.S. Customs Service. Other Census programs including demographic statistics, the agriculture census, and the transportation statistics shed light on various aspects of energy in a less direct fashion. Censuses and annual surveys are conducted by the Census Bureau on a mandatory basis.

The Federal Power Commission (FPC) has responsibilities for regulation of the price of interstate transmission of natural gas and nonnuclear electricity generation. The FPC collects data necessary to conduct these activities including reserves of natural gas dedicated to interstate pipelines and data on the cost of producing electrical energy as well as the sales and prices of electricity. The FPC data collection authority does not extend to reserves of natural gas used solely in intrastate markets.

The Energy Research and Development Administration (ERDA) is responsible for developing a national plan for research on energy which is an important component of achieving U.S. energy independence. ERDA has units which are concerned with: conservation, environment and safety, fossil fuels, solar, geothermal and advanced energy systems, nuclear energy, and na-

tional security. Reference information on research and development technology is abstracted and maintained by ERDA. ERDA is also a significant user of general-purpose energy statistics.

The Nuclear Regulatory Commission (NRC) is involved with the regulation and licensing of nuclear power plants. This agency concentrates on the health, safety, and environmental aspects of the technology used to produce electrical energy from nuclear sources, and the demand and supply position facing the industry. NRC has a field staff of plant inspectors to check on hardware performance, to investigate accidents, and to monitor radiation release.

In addition to the agencies mentioned above and several others which are less heavily involved in energy statistics, there are two major energy coordinating bodies with representation from many agencies.

The Energy Resources Council (ERC) is chaired by the Secretary of Commerce and has as members the heads of several Departments and agencies. The Administrator of FEA is the Executive Director of the ERC. The purpose of this Council is to provide a forum for development of a coordinated energy policy at the Presidential level. While it is a strong force for determining national energy policy, its relationship to information is as a user. ERC decisions have far-reaching implications for statistics gathered by particular agencies in their regulatory or policy roles.

The Federal Interagency Council on Energy Information was formed in 1975 to provide improved coordination and planning for energy statistics collected and tabulated by many Federal agencies. The charter provides for a rotating chairman, and ERDA presently chairs the Council. The Council serves as a forum for general discussion of many energy information issues which arise. In addition, the Council has undertaken several specific projects including: the development of standards for energy terminology in data collection, the development of a data element dictionary, and the identification of energy data requirements and unmet priority needs in particular areas. Thus, in addition to the coordination role performed by OMB and the General Accounting Office, the Council is a major force in improving the quality and breadth of Federal energy statistics.

Basic Program

The Federal Government collects and analyzes a great amount of information on energy. It is helpful to present a general description of this program by the way in which energy is found, produced, distributed, and used by the economy. It is also important to identify the principal uses for data in each stage of the cycle. Each of the following subsections includes important programs for different energy sources and some general comments as to their quality.

Reserves, Resources, and Exploration.—Information concerning the reserves, resources, and exploration of oil, natural gas, coal, and uranium is needed for several reasons. First, it is essential that the Government have an estimate of the future supply of energy which involves estimating the amount of the basic U.S. energy resources which are or will be available to meet the demands. Second, Federal policies designed to encourage exploration may be evaluated by examining the amount and causes of additions to proved reserves on a yearly basis and the level of exploration activity undertaken. Third, the determinations of leasing policies and the management of Federal leases involves estimates of those reserves on Federal lands. Fourth, regulation of the interstate price of natural gas and the effect of possible deregulation require data on gas reserves dedicated to or associated with the interstate market. Finally, data on the characteristics of reserves and resources help to indicate the directions to be pursued in developing new technology for extraction.

Reserves and Resources.—Many agencies are active in this area, notably the Department of the Interior's Geological Survey and Bureau of Mines, the Federal Power Commission, the Federal Energy Administration, and the Census Bureau. The Bureau of Mines is the major source of data on the coal extracting industry. Bureau of Mines' systems contain data on location of coal mines as well as the production of coal. BOM and FEA are currently negotiating an agreement to designate BOM as the data collecting agency for coal, using FEA's mandatory authority to gather the information. These systems were supplemented during and immediately following the OPEC oil embargo in the early days before new data systems could be established.

The U.S. Geological Survey's Conservation Division has regulatory responsibility for estimating the value of reserves in the Federal lands including the outer continental shelf and for monitoring Federal leases. A great deal of testing and production data is collected to enable the Division to estimate the reserves and the maximum effective rates of oil and gas production. Offshore exploration activity is also reported. This is a relatively new program which should be expanded to cover adequately all of the areas under the jurisdiction.

The Geologic Division estimates resources of fuel which are as yet undiscovered. These estimates are constructed from a mixture of reserves data, available geological information, and formulas based on past studies of production from established oil and gas fields. These should be improved, because they rely on old data. The methodology underlying these estimates also requires improvement.

Estimates of resources are subject to significant errors. Even proved reserve numbers are judgmental estimates based on indicative data, and expert geologists and petroleum engineers may differ on their implications in estimating the extent of proved reserves. These errors can only be corrected as a field is produced and additional data become available. The point is that estimates of cubic feet of gas or barrels of oil in the ground will usually be more or less "soft" and indicative with any cost effective level of data collection effort.

The Federal Power Commission needs estimates of reserves of natural gas primarily to regulate interstate gas pipelines and to study natural gas curtailments in periods of short supply. FPC has collected data on reserves dedicated to interstate pipelines on FPC Form 15. This form covers only about 60% of the total supply of natural gas since it does not extend to intrastate gas operations. The recently promulgated FPC Form 40 will have greater coverage since it seeks information from owners of natural gas reserves which are sold to interstate pipelines or organizations affiliated with those who sell to pipelines. Form 40 reports will be audited by teams of geologists and petroleum engineers for accuracy. At present there are legal challenges to FPC's authority to collect data on affiliated gas and the matter is before the courts. Statistics on exploration can also be derived from these two FPC forms. FPC has also used reserves estimates published annually by the American Gas Association (AGA) and the American Petroleum Institute (API) in determining reserve additions and costs and the interstate price of gas.

The Federal Energy Administration conducted an Oil and Gas Reserves Survey for 1974. This study was mandated by Congress as a complete and independent survey. The FEA surveyed about 15,000 operators who account for an estimated 95% of all reserves. Seven hundred reports were audited by independent contractors and the FEA. Independent estimates of reserves were conducted for 59 of the largest fields from input data. The FEA estimates tended to confirm the API and AGA published estimates overall, although some of the individual field estimates showed significant differences.

The Federal Trade Commission recently examined the industry's reserve estimates for some important oil and gas producing regions in Louisiana and the Gulf of Mexico. FTC believes their study indicates significant inconsistencies in the estimates leading to serious questions about the overall totals published by industry.

The Securities and Exchange Commission requires public reports from registered companies. Securities registration statements and the annual Form 10-K include information on all material assets of the issuers, including their holdings of oil and gas reserves. SEC relies on the opinions of auditors as a check of these estimates. The SEC requires the filing company to produce such basic data as are necessary to support their filing. Since coverage is incomplete and the definitions used have not been the same across companies, the SEC filing requirement is not a source of comprehensive data but is duplication of reporting burden.

The American Petroleum Institute and the American Gas Association have estimated proved reserves of oil and gas for many years. Their reserves committees consist of experts in particular regions who compile estimates of particular fields. The engineers and geologists have at their disposal records from their own companies and from public sources but do not necessarily have data from all companies which operate in a given field. The resulting estimates are based on a give-and-take within each area subcommittee. These industry estimates are viewed with suspicion by some congressional committees (e.g., Senate Interior and Insular Affairs Com-

mittee) and some members of the public since they tend to support the notion that reserves are scarce and the Government should take steps to promote expanded exploration and development. Other experts claim that the industry estimates are about the best that can be made. API and AGA officials have stated that they would discontinue their program if Government would conduct such a survey annually.

An *ad hoc* group of agencies came together, with OMB serving as chairman, and published a report with recommendations for the next comprehensive government survey of oil and gas reserves. FEA held an early public meeting on this subject, and OMB held another with participation from industry, public interest groups, and outside experts. The main effort is to determine to what extent several agencies' requirements can be consolidated into one data collection effort. The FPC, FTC, Conservation Division of USGS, and SEC request data on an ownership basis, while the needs of FEA, ERDA, and Geologic Division of USGS are better served by collecting data from operators. The basis on which the estimates are to be calculated, whether by fields, reservoirs, or states; and whether the data are to be collected from owners, operators, or pipelines has yet to be determined. Other questions include the extent and method of data verification and coordination with industry's existing efforts. A proposal for the survey is currently under consideration by FEA.

Reserves of nuclear fuel are also of significant interest in providing for the country's future energy needs. There is active debate as to whether nuclear energy will provide a virtually inexhaustible supply or whether it is only a short-term stopgap for the United States. Uranium resources have been assessed by ERDA (previously by the Atomic Energy Commission) and by the U.S. Geological Survey. Recently, however, these two agencies concluded an agreement to conduct a national uranium resource evaluation in which ERDA will have prime responsibility to collect and verify data annually while the Geological Survey will make resource estimates for those areas for which it has made detailed geologic studies, supplying that information to ERDA. Also, the Geological Survey, Bureau of Mines, and ERDA are collaborating to establish a classification system for uranium reserves and resources to improve the estimates.

Exploration.—The Bureau of the Census is a major source of information on energy exploration. The quinquennial census of mineral industries collects data on oil and natural gas exploration expenditures and drilling statistics as well as on coal mining. These data are extensive, covering types and characteristics as well as geographic area of activity. The annual survey of oil and gas collects data on exploration and development of oil and gas and the degree of owner operation. Statistics are shown separately for the continental United States, offshore activities, and for Alaska. The annual survey is also a source of data on production, revenue, sales, and assets employed.

In the 1960's the Interagency Petroleum Statistics Study Group was established to improve the Government's petroleum statistics. The actions of this group led to improvement in the well-drilling data, including field development and exploratory wells as well as drilling cost data. Another result of this group's activity was the representation of Government on the working subcommittees of the industry's oil and gas reserves reporting committees.

Production, Supply, Processing, and Distribution.—The majority of the policy and regulatory decisions in energy deal with production, supply, processing, and distribution of energy sources. The bulk of the Federal data acquisition activity is concerned with this stage of the energy cycle. Federal policy concerning allocation of petroleum to areas of the country and to different producers, pricing of petroleum products and natural gas, heating oil and gas availability, production of electrical energy from fossil and nuclear fuel, and related environmental questions are based on information collected from industry. In addition, such general information bases as the national energy accounts, which has been created and will be updated by FEA, require great amounts of such data.

The Bureau of Mines collects production, supply, and distribution data from refineries, crude and petroleum producers, pipelines and other distribution elements. Information is published monthly in the *Minerals Industry Survey* series and in monthly and annual reports on petroleum refining, distribution, and consumption. The Bureau's Fuels Availability System provides such data for petroleum, natural gas processing, and coal.

As stated above, the Bureau is the main agency responsible for coal data. BOM collects extensive data on samples and characteristics of coal produced and distributed as well as the surface and underground conditions of coal mining. Data are collected from railroads on coal shipments, costs, and other operating data on transportation in cooperation with the Department of Transportation.

Under an agreement with FEA, the Bureau of Mines is designated as the data collection agency for the Integrated Petroleum Reporting System. This system is comprised of four basic survey forms which cover refineries, bulk terminals, and pipelines. In this system, data are collected on production, stocks, and shipments. The latter are classified by user category for crude oil production. When it is fully operational, several pre-existing survey forms can be eliminated. The system is somewhat incomplete, since it does not have imports of petroleum products in its current design, and it may take several months of experience before the agencies are fully satisfied with the resulting statistics.

This joint FEA-BOM agreement is one of the best examples of interagency coordination in the energy statistics area leading to an improved data system with minimal respondent burden. Agencies should explore similar arrangements in other energy subjects, as is being done with coal, uranium reserves, and some others. A more serious challenge is to bring more than two agencies together in one agreement, as is being done with petroleum import data and with the oil and gas reserves survey.

The Federal Energy Administration has many statistical forms and regulatory reports describing production, supply, processing, and distribution of petroleum and natural gas. While there is some duplication with the FEA-BOM system, several of these surveys are regulatory in nature and could not be included in that system. The mandatory crude oil allocation program, designed to ensure sufficient supplies of crude oil to small and independent refineries, includes a quarterly survey of refinery capacity and crude oil runs to stills. Another system, managed by the FPC for FEA, monitors the types and amounts of energy used in electric utilities including fuels consumed, inventories on hand, and monthly power generation. Residual fuel oil consuming utilities and propane/butane producers are also surveyed for regulatory purposes.

Imports of petroleum are measured both to determine the extent of the U.S. dependency on foreign supplies of energy and to administer the special petroleum fee collected by FEA under the mandatory oil import allocation and licensing program. This system relies on both direct reporting to FEA and required reporting to the U.S. Customs Service on import declaration forms. The Census Bureau also compiles and publishes monthly import statistics, including data on imports of petroleum and petroleum products, utilizing a statistical copy of the import declaration form filed with Customs. Because Census monthly data is based on "date of filing" import declarations with Customs, FEA and Census statistics showed different monthly import totals for the months before and after the imposition of the special petroleum import fee. Because of this anomaly, OMB established and chaired a task force consisting of representatives from FEA, Customs, and Census which has recommended that Census use a different date for purposes of compiling the monthly import statistics, namely the "date of import" reported to Customs on the import declaration. The results of this change are: (1) Census and FEA statistics will be more consistent; (2) all Census import statistics will be a more accurate reflection of shipments received in a particularly defined month; and (3) FEA can eliminate its requirement for duplicate company reporting on imports, thereby reducing the respondent burden. As this is being implemented, FEA and BOM should see if there is a continuing need for import statistics collected on the refinery reports where imported crude oil received by refineries is reported in several places, and to review and consolidate the product classification schemes used by Customs in the Tariff Schedules of the United States, Annotated (TSUSA), by the Bureau of Mines, and by FEA which requires an end-use designation for fee collection.

FEA has also established a program in cooperation with the FPC, and the Departments of Interior and Commerce to monitor natural gas supplies and curtailments to particular types of users and to particular regions of the country. Information is collected on sales, deliveries, curtailments of natural gas to direct end-use customers, and alternative fuels requirements of those customers. The FPC surveys interstate pipelines and the FEA covers intrastate gas shipments. FEA and FPC also collaborate on surveys of underground storage (inventories) of

natural gas as part of the natural gas curtailments exercise.

The Bureau of the Census also collects data which relate to energy production, processing, and distribution. The census of manufactures, an extensive quinquennial data collection program conducted on a mandatory basis, provides input, output, and cost information on petroleum refining, coal, crude oil, and petroleum based chemical products and related industries. (It is also a major source of data on energy consumption in manufacturing which is discussed below.) The annual survey of manufactures provide more frequent data on energy and related industries. On a cyclical basis, the Current Industrial Reports program covers energy-related industries including lubricating, oils and greases, and asphalt.

Several other agencies collect and publish data on energy production. The FPC collects extensive data on electric power generation including fuels used, capacity, and relative costs. It also has data on production and sales to interstate natural gas pipelines. The Nuclear Regulatory Commission collects data on the operation of nuclear energy production plants' reliability, performance, safety, and environmental factors as well as on uranium productions and enrichment plants. The U.S. International Trade Commission collects much of the available data on petrochemical feedstock production.

In general, although a great deal of information is collected for regulation of production, supply, and processing of energy, the data collected are not fully integrated with the statistical data. In addition, while several interagency efforts are underway, much remains to be done in the effort to coordinate and simplify data programs, to relate them to agencies' information requirements, and to accomplish a reduction of reporting burden. Overlap of agency concerns is obvious in some of the areas described above. The affected agencies, with FEA leading, must examine these on a case-by-case basis to achieve significant consolidation.

International Energy Statistics.—The ability of the United States to get the energy it requires depends increasingly on supply and demand beyond our own borders. To the extent that we can modify foreign demands or increase foreign supplies, we can improve our own situation. To accomplish either objective we must be thoroughly informed on what is going on in the energy world outside the United States.

We are not so informed. We do not have an adequate statistical basis for appraising the world energy situation and outlook. The data available do not stand up under close inspection. Before they can be used with assurance, they will have to be tested, improved, and carefully coordinated.

FEA is now making an effort to improve both the quality and the coverage of world energy data, mainly by working with, and drawing on the work of international agencies active in this field.

FEA is reviewing in depth the energy data published by these and other groups, extending these data to areas not now covered by international agencies, and bringing them together in a uniform, world-wide system of energy accounts. To assist the international agencies and thereby simplify our own work, FEA has produced a handbook of *Tables and Factors for Comparing and Combining Energy Data.* FEA has also participated in international working parties on energy statistics, such as the one brought together to prepare recommendations concerning ECE's *Annual Bulletin of General Energy Statistics.*

Consumption of Energy.[1]—One-half of the energy independence equation is demand. Planning for the achievement of independence from foreign sources requires an accurate estimate of the energy requirements of our society. Energy is required to power the production process, to provide for commercial and private transportation, and for consumer uses such as residential heating. Energy is required to produce more energy. Studies of the adequacy of reserves and resources and of the production and importation of energy must be evaluated against the potential demand. Of course, prices, market structure, and new technology are important factors in the equation, and statistics on these aspects of energy are discussed below.

While there are several sources of information which bear upon the consumption of energy, it is fair to say that Federal energy statistics are least adequate in this area. The data needs of agencies both Federal and State are not well articulated

[1] This section draws heavily on the National Academy of Sciences—National Research Council report, *Energy Consumption Measurement: Data Needs for Public Policy,* 1976.

nor has sufficient effort been applied to energy consumption data to make the necessary improvements. The data requirements task force of the Federal Interagency Council on Energy Information has taken this issue as its first project, largely because the Census Bureau is presently planning for the 1977 economic censuses, and since it is anticipated that a detailed evaluation of data user needs will assist in the improvement and availability of data as they apply to the energy problem.

The need for energy consumption measurement goes beyond the mere description of energy usage by sector of the economy which is, however, a necessary first step to answering the important questions. Predicting energy consumption in the future requires modeling potential changes which depend on an understanding of many economic and social relationships which determine energy usage. For this effort, demographic and even psychological factors must be identified in addition to understanding the effects of actual and expected changes in relative prices and technology on energy demand. Finally, special data are needed to assess the probable impact of changes on Federal policy, including regulatory policy, on U.S. energy consumption and on particular segments of the population and specific industries.

For the description of energy usage, different methodologies are required to describe different sectors. One methodology, which is most appropriate to the description of energy consumption by households and by commercial segment of the economy, is the stock-flow approach. In this approach, the stock of energy using equipment (e.g., space conditioning, household appliances, transportation vehicles) is determined, its energy consumption characteristics described, and its level of utilization (flow) is measured. Another approach, which is best applied in the manufacturing sector, involves measuring the energy input per unit of output (embodied energy) in transforming a raw material into an intermediate or finished good. This latter approach is akin to the input-output approach used to explore the energy consumption implications of technological changes in production processes and of patterns of final demand.

In the household sector, which consumes 33% of U.S. energy, the available descriptive data are best for electricity and natural gas consumption, and some indicative data exist for personal transportation. Data are not as good on the use of home heating oil and usage of appliances, and are largely lacking insofar as housing characteristics, behavioral reactions to price and other future expectations, and fuel efficiency of the existing stock of automobiles. Electricity usage is derived primarily from private studies based on utility billing information published by the Edison Electric Institute. These are aggregate sales data which are not available in terms of dwelling unit characteristics. The American Gas Association has similar information with respect to natural gas used in the home. One serious deficiency of such data involves the difficulty of separating energy used in multifamily dwellings from that used by commercial establishments due to the billing process which often lumps the two together in one rate class.

Personal transportation, comprising about 15% of U.S. energy consumption, is monitored partially by the Census Bureau's data on automobiles and trucks owned, although personal truck uses are not distinguished from commercial uses. The Automobile Manufacturing Association's data on automobile ownership are useful here as well. The consumer expenditure survey of the Bureau of Labor Statistics (BLS) and the trip data from the Census Bureau provide certain data related to household energy consumption for transportation, in some cases classified along demographic lines. There is little data on energy efficiency of the stock of vehicles. Finally, the FEA's household panel survey, already conducted twice, provides some data on personal responsiveness to changes in price and other supply conditions. This important survey should be continued in the future.

The data describing household energy needs for space conditioning and for operating major appliances is largely an empty set at present. While something is known about the equipment built into new housing from the Census Bureau's surveys and the intensity of appliance usage from some private studies, there is very little information available on energy consuming characteristics of the stock of housing and the functional end-use of energy consumed in the household. These data would be most useful to inform policymakers about alternatives if it were linked to demographic characteristics of the households. Finally, we should develop surveys and other methods of finding out about personal preferences as to energy lifestyles (mass transit usage, second home, size of car) as they relate to

policy actions (e.g., public education, campaigns, changing tax differentials), and expectations of future relative prices.

Energy consumption in the industrial production process accounts for 35–40% of all U.S. energy used each year. This rate of consumption, however, is predominantly due to the need of only a few industries which use energy intensively to change the form of input materials and which bulk large in the U.S. economy. Any list of the major energy consuming industries would include primary metals, chemicals, petroleum refining, coal production and processing, and production of paper, and production of glass products which account for well over half of the industry usage. It is not useful to apply the stock-flow approach to this sector, since the stock of machines used in these industries is so heterogeneous and interdependent in terms of energy used that description of the stock and its utilization would be impossible. The preferred approach is to measure the energy embodied in the product of a particular industry, whether intermediate or final products are produced, within the input-output framework.

Some information on industry demand for energy is available from the Bureau of the Census. The quinquennial census of manufactures provides data on the quantity and the value of energy inputs consumed in production classified by consuming industry. Electricity used is collected, as is the use of fuels for heat and power in manufacturing and mining. Other fuel products, including butane and propane, used by major consuming industries is also collected in the census. The Census Bureau produced a special report on fuels and electricity consumed by industry and geographic region as part of the 1972 census. The Census Bureau has issued reports from the 1974 Annual Survey of Manufactures which provide data on individual fuels and electric energy consumed by 4-digit SIC industry, State, and standard metropolitan statistical area and is compiling similar information from the 1975 Annual Survey of Manufactures. It is important that agencies which use energy statistics, principally FEA and ERDA, work closely with Census to enhance the energy consumption aspect of these data. Currently, FEA is working with Census in regard to the annual survey of manufacturers which does not collect information on fuels consumed as feedstocks, self-generated or captured.

Census data, as well as some other statistics listed here, are incorporated into the benchmark input-output tables produced by the Bureau of Economic Analysis of the Commerce Department. These analyses are particularly useful since they are conducted within the general framework of statistical activities covering many aspects of all industries. The Federal Reserve Board publishes a monthly series on electric power used in industry in conjunction with the work on the Index of Industrial Production. The Federal Power Commission, in a coordinated effort with FEA, collects, on a monthly basis, data on the fuels used by electric utilities.

The Bureau of Mines collects data on the use of energy in extracting and refining industries. The Bureau also collects a monthly fuel consumption report from manufacturing plants in which fuels consumed are shown for different types of coal, oil, gas, and coke. This latter effort appears to be more within the scope of the Census Bureau's area of responsibility requiring a sample survey of manufacturing plants. BOM also surveys distributors and large retailers of petroleum products to determine purchasers and broad end-use categories of demand.

FEA data collection activity in the industrial energy consumption area is limited. Consumption data systems relate to the fuel consumption of major fuel burning installations for examining possibilities for conversion to coal, and the voluntary industrial energy conservation program (with Commerce) which uses data produced by trade associations.

Data on industrial use of energy could be improved significantly by expanding the scope of the Census Bureau's survey of fuels and electric energy consumed to cover functional end-uses by broad classes (materials processing, space conditioning, and transportation). For the energy intensive industries we need to know more about energy consumption per unit of output both in physical and nominal units and the extent of use of self-generated (byproduct) heat in the plant. Additional data should be collected which would indicate the elasticity of energy demand with respect to expected future relative price changes since different energy consuming processes or energy conservation as byproduct of a production process may be chosen. There is a need for quarterly and monthly industrial consumption data. Most current data are annual and are often inadequate for dealing with crises situ-

ations such as the natural gas shortage experienced in the winter of 1976/1977.

The non-energy intensive industries could be profitably treated within the stock-flow model described above for the household sector. In this sector, knowledge of the space conditioning and transportation needs is slight.

For the agricultural production sector, the census of agriculture data provides quinquennial information at a detailed geographical level on farm expenditures for energy and some energy-related products such as fertilizer. The Department of Agriculture's annual economic survey of farms collects similar data annually, and it should be expanded in detail.

For the commercial sector—defined broadly as neither industry nor household—several studies have been made outside the government, for instance on the energy demand at hospitals or schools, but there exists no true data base. In fact, there is no consensus on how to define the commercial sector except in the area of commercial transportation where the data are better. Included in the commercial sector, however, would be retail and wholesale establishments which utilize much of their energy for heating, lighting, air conditioning buildings, and transporting merchandise. Again in this case, data on the stock of buildings as well as equipment and end-use of energy are needed but lacking.

The data situation for commercial transportation, which accounts for almost 20% of U.S. petroleum consumption, is better than that for the balance of the sector. Reports indicating fuel usage are required of Class I railroads by the Interstate Commerce Commission (ICC), and of commercial aviation by the Civil Aeronautics Board. Commercial trucking is the largest gap in this area, but even here some data exist. The Census Bureau's trucking inventory and use survey gives a picture of the stock of trucks, whether commercial or private, and the type of fuel required. Additional information is available from the Federal Highway Administration, ICC, some state offices, and the General Services Administration for the Federal Government. The Census Bureau's commodity transportation survey collects data on trips, modes used, and cost of trips for a sample of shipments from manufacturing establishments classified by commodity shipped.

Commercial transportation statistics are not adequate for nonregulated trucking and there is only a little data, primarily in nongovernmental studies, on the technology of modifying trucks with energy conservation devices, for example, to make trucks more aerodynamically viable. Little data is available on intracity commercial trucking.

It is fair to say that consumption is the least well-measured aspect of the energy cycle. In response, the FEA has planned to develop the energy consumption data base which will bring into one system all such existing data from whatever reliable source and may collect more basic data. One output of this project will be the identification and prioritization of data gaps.

Prices of Energy.—The chapter on price statistics addresses overall Federal Government price statistics programs. There are several sources of data specifically dealing with energy prices which are more appropriately discussed in this chapter.

Many of the statistics on energy prices are collected by the Federal Energy Administration largely for regulatory programs inherited from the Cost of Living Council. Regulations provided for pass-through of certain costs, for instance, costs of obtaining foreign crude oil, and the prices must be observed at various stages in the production process to monitor that program. Price data also support other programs such as crude oil entitlements for refineries. One limitation of these data series is the lack of historical information since the data are derived for recently instituted regulatory programs. Also, since they are derived from regulatory programs it is difficult to consolidate these series into a price data system. Another is that they are not necessarily related to any overall framework of price statistics; components of ongoing BLS series may be more suited to overall analysis in this regard. Still, price statistics are collected at many stages and their relationships and recent movements could be used to examine the way costs are transmitted to final consumers.

FEA monitors prices of imported crude oil monthly to establish a representative arms-length price for use in evaluating transfer prices of petroleum companies. Number 2 heating oil prices are collected monthly for cost pass-through regulations and to determine margins for policy decisions. Prices of new domestic crude oil produced, released oil, and stripper wells are also collected monthly. Another survey collects prices of petroleum products from re-

fineries, gas plants, resellers, and retailer. Price data are also collected on retail diesel fuel sales and on heating oil, propane, residual fuel, and other covered products.

The Federal Government's price statistics are principally collected by the Bureau of Labor Statistics for the Consumer Price Index, the Industrial (Wholesale) Price Index, and in the international price competitiveness program. It is sufficient to note here that several of the components of those indexes are concerned with energy. These include series on gas, electricity, gasoline, fuel oil, and coal.

Value data can also be derived from statistical or regulatory data of other agencies. The coal reporting systems of the Bureau of Mines provide data on the value of coal shipped. The FPC collects extensive data on the electric utility industry including retail electricity rate schedules and typical monthly bills for residential, commercial (including multifamily residential housing in many cases), and industrial electricity consumption. Interstate prices of natural gas are also regulated by FPC. While quantity and value information is a relatively poor way to derive price data—transactions prices are more relevant and reliable to more applications—mention should be made of such data on coke, coal, fuel oil, gas, and gasoline collected by the Bureau of Census and on fuels used by carriers by the Interstate Commerce Commission.

Finance, Structure, and Ownership.—Several important issues in energy policy revolve around industry performance as it is related to finance, structure, and ownership. Among these are the implications of a vertically integrated industry on prices, profits, production, and exploration activities. Public debates on divestiture, gas deregulation, and the use of imported oil from foreign production all require information. The adequacy of financial capital over the next decade is another serious question. Finally, the degree of energy independence is related to the extent of foreign ownership or control of U.S. energy companies.

The Federal Trade Commission has conducted special studies of the structure, conduct, and performance of various energy industries, including the effects of governmental policies on energy supply and prices. FTC's statistical surveys, including the ongoing Quarterly Financial Report (QFR) and the new Line of Business survey (LB) also shed some light on the petroleum industry's profit performance. The QFR industry data suffer from lack of industry specificity since diversified companies' reports on all of their domestic operations are classifed by their primary industry.

Other financial data are reported to the FPC by gas pipeline companies and by electric utilities, and to the Securities and Exchange Commission for all registered companies. The Statistics of Income program of the Internal Revenue Service shows tabulated income statements and balance sheets for petroleum refining and related industries, coal mining, oil and gas producers, and petroleum wholesalers, classified also by asset size. The IRS data are derived from corporate tax returns which are subject to some problems, since the firms may file consolidated returns, and the data may not be fully comparable from one year to the next.

It should be noted, in this connection, that a committee of regulatory agency accountants has developed recommendations for a uniform corporate reporting form which could be used by all agencies to collect a core set of data from their respective sectors.

The FEA is considering developing a petroleum company financial reporting system in response to needs for information on financial structure, ownership, flows, competitiveness, and other conditions of the petroleum industry. The conference report on the Energy Conservation and Production Act and the ECPA require cooperation between FEA in determining information requirements and SEC, together with the Financial Accounting Standards Board, to develop standard accounting practices for the extractive industries. FEA is required by the Energy Policy and Conservation Act to collect and report financial data quarterly. This requirement together with the annual reporting system constitutes FEA's financial information program.

Ownership relationships, including foreign ownership, of U.S. energy firms were described in a FEA document, "The Petroleum Industry: A Report on Corporate and Industry Structure and Ownership." The Commerce and Treasury Departments have recently concluded a survey under the Foreign Investment Study Act which contains similar industry data on foreign ownership.

Industry composition and concentration is explored in Census enterprise and establishment statistics from which concentration ratios can be derived for particular industries. Market shares data are collected by FEA directly and in cooperation with Census to determine the extent of competition between brand and nonbrand gasoline outlets, and between refiners for several product markets.

It is clear that at the present time the information on finance, structure, and ownership needed for policy decisions about decontrol, the effects of regulation, economic impact, and explaining regional price differentials is largely lacking. Reporting of profits for particular segments of the diversified firm presents a difficult accounting problem which is exacerbated by a vertically integrated situation such as is found in the petroleum industry. A great deal of analytical work has been done to develop a data base consistent with generally accepted accounting principles. The SEC is designing new standards for petroleum company accounting which, when promulgated and adopted, will simplify the job of making intercompany comparisons and provide for consistent aggregation of data. The Bureau of Economic Analysis should move to implement a financial reporting system at least as soon as the new standards are available.

Major Data Gaps and Suggested Improvements

The description of the principal data bases has pointed up some areas in which the Federal Government's energy information is sufficiently well developed but in need of more coordination, and other areas for which the data are scarce or inadequate. Activities underway which will lead to needed improvements in some of these areas are mentioned above.

Two major efforts just now underway at FEA include the validation of all government energy information systems and the development of the National Energy Information System which are mandated by the ECPA. The OEIA is responsible for providing adequate, comparable, accurate, and credible energy information and will use these two programs to improve and document the quality of all energy statistics. These activities will also facilitate the identification of data gaps requiring the creation of new data systems. These are long-term projects requiring the cooperation of many agencies.

Energy data are weakest in the areas of energy consumption and of ownership and financial data. It is here that the data requirements task force of the Federal Interagency Council on Energy Information has decided to concentrate its resources and where the FEA's consumption data base framework will help to identify data needs.

In the previous section, several recommendations were made for improvements in energy consumption statistics. If adopted, they would require among other things more data on: (a) the characteristics of the stock of housing; (b) on the facilities and equipment used by commercial and minor industrial energy users with measurements of energy consumed by functional end use; (c) expanded energy consumption data for heavy using industries to be collected by Census; and (d) studies of the substitution of energy conserving measures in housing, appliances, vehicles, lifestyles, and production process given an assumed range of prices or availability of supply. Each of these data types is difficult to collect. For instance, functional end-use data cannot be accurately collected from suppliers. Prospective decisions of household members about their reaction to hypothetical energy scenarios would be difficult to rely upon. Data on commodity transportation classified by mode, cost, and other factors would require extremely large samples. In addition to those recommendations cited above, several others could be made.

More information is needed on the regional consumption of energy, both for planning purposes and to help the States in their conservation efforts. The recently enacted Energy Policy and Conservation Act mandates FEA cooperative programs with the States in developing conservation plans, and this will require such data. For some purposes county level data are needed, for example, to provide an interface with environmental assessments which must be conducted for watersheds or airsheds.

A major factor in energy consumption over the next decade is the elasticity of demand with respect to changes in relative prices. While there are many data collection systems which produce measures of prices at different stages of the energy production-consumption process, they are not clearly interrelated nor do they necessarily fit into an overall framework. FEA, BOM, BLS, and ERDA should inaugurate a task force to explore the adequacy of existing energy price

data for this purpose and to determine whether new series should be constructed.

For natural gas, the data on intrastate prices is not now collected by the Federal Government. Yet the deregulation and natural gas curtailment debates would benefit significantly from such information. FEA and FPC should take steps to evaluate the quality of available private and State data sources and to determine whether they are adequate to the Federal Government's needs.

Even for petroleum refineries, the data on prices is insufficient for analytical purposes. At present, the Federal Government relies on Platts' spot prices which may not be adequate. FEA should attempt to convert the regulatory data or to develop a statistical system to obtain price data consistent with other refinery data systems and price indexes presently in existence.

Transportation of energy is not well measured except for interstate natural gas pipelines by FPC and oil pipelines by Bureau of Mines. For planning purposes, it is important to know how energy is transported across State lines. Certain information is available on shipments between Petroleum Administration for Defense (PAD) districts, but these districts encompass several States and data on intra-PAD petroleum product transportation is not known. The Bureau of Mines should determine how best to collect these data.

Finally, in transportation, more knowledge is needed concerning the costs associated with transportation of energy to assess the cost of providing for final use demands and to assist regional and State planning. Some method for determining the quantities and the origin-destination of these shipments is needed. This is an interagency task involving FEA, FPC, BOM, and DOT.

Energy data are the most fully developed in the production phase of the cycle. Still, some improvements can be made. Better measurements of efficiency, costs, and productivity are needed for petroleum, gas, and coal. These phenomena depend on the surface and subsurface conditions in the field, for example, slope and sulfur content are important factors. The FEA-BOM petroleum reporting system and the BOM coal reporting systems should be improved in this respect. Costs associated with reclamation, particularly for strip mining, are essential given the increased emphasis on the environmental impact of extraction. Even for coal shipments the data available are not of sufficient quality. Monthly coal production, which is largely estimated by freightcar loadings, has been subject to significant revisions recently, and the FEA and BOM should examine alternative strategies to collect such data.

Concerns are raised in definition and classifications in several aspects of energy supply. Perhaps the most important step is to agree on one definition of reserves of oil and gas. Mention has also been made above of a new cooperative effort involving FEA, Customs, BOM, and the Census Bureau to improve the information on bulk petroleum imports. These agencies must now get together on a common classification system of the products which are imported. The concept of petroleum inventories in bulk terminals is not yet clearly defined. For instance, inventories may be counted twice, once as reported by the pipeline and once by the bulk terminal which has contracted for a shipment not yet received. The FEA should clarify the concept and reconcile the data. The Federal Interagency Council on Energy Information is currently exploring standard terminology and definitions.

Information on reserves of oil and gas are collected by several Government agencies including FEA, FPC, FTC, SEC, and Interior. Efforts are underway to review this situation in order to develop a coordinated approach to these programs wherever possible. It is clear that the Federal Government should collect such data on an annual basis. Net additions to reserves indicate the success or failure of policies to encourage exploration and secondary recovery, and can indicate the extent to which the level of provided reserves responds to changes in prices received at the wellhead. The Interagency Ad Hoc Task Force on the Oil and Gas Reserves Survey should determine how to conduct the survey to meet the basic reserve data needs of all agencies, and whether a single agency could be assigned this task. Prime candidates are FEA, BOM, and USGS.

Other energy sources are less well covered than are coal, oil, gas, and uranium. New sources of energy, mainly solar energy, are largely unexplored areas. While research and development is well documented by ERDA, the production of solar energy units, their capacities and performance characteristics, and demand are only guess-

es at the present time. Residential and commercial heating and cooling potential of solar energy has been studied only marginally. The possibilities for geothermal energy must be examined. While ERDA is a logical agency to conduct these studies, its data collection authority may be limited. Hence, FEA or Commerce should be encouraged to develop a solar and geothermal energy statistics program.

The possibility of shortages of particular types of fuel requires the ability to monitor the demand for, as well as the supplies and inventories of, fuel types. While shortages in the past have been monitored largely on an *ad hoc* basis, an interagency effort is needed to develop a standby data system which can be implemented in an emergency. FEA is currently developing systems to monitor such energy emergencies as coal strikes, electricity shortages, and petroleum embargoes.

Organization and Coordination of Energy Information

Energy information activities of the Federal Government are performed by many agencies with different mandates. The General Accounting Office has estimated that, as of July 1975, there were 261 separate Federal energy or energy-related information programs being conducted by 44 Federal agencies or bureaus with 98 separate computerized data files containing energy data. At least twenty energy-related bills have been enacted into law since the start of 1974 and seven of those have included specific mandates for energy data programs. The most important of these bills are the Federal Energy Administration Act of 1974, the Energy Supply and Environmental Coordination Act of 1974 (ESECA), the Energy Policy and Conservation Act (EPCA), and the Energy Conservation and Production Act (ECPA). Many of the requirements and programs were entirely new or major expansions of existing programs. To a significant extent these programs are required in addition to the statistical programs of established statistical agencies such as the Census Bureau and the Interior agencies (Bureau of Mines and Geological Survey).

Congress has perceived these statistical efforts to be fragmented and uncoordinated, overlapping and duplicative, and yet not adequate to serve the Federal Government's information needs. GAO has reviewed the situation several times, including a February 1974 report entitled, *Actions Needed to Improve Federal Efforts in Collecting, Analyzing, and Reporting Energy Data,* and in an update (March 1976) of that study for hearings before the Senate Committee on Interior and Insular Affairs.

This emphasis on the attention to the energy information programs of the Federal Government has resulted from a perception of several problems associated with obtaining reliable statistics. While these problems are not unique to energy statistics, they are perhaps more acutely felt there than in some other areas. The problems which have been identified characterize data on both the industrial and residential sectors and are as follows:

- Voluntary v. mandatory reporting. The Bureau of Mines has collected much of its data on a voluntary basis. Many people, including the Senate Committee on Interior and Insular Affairs, view this arrangement as unsatisfactory. Public policy and industry interest often conflict and information submitted by industry with no penalties for inaccurate responses or nonresponse may be unreliable. This has led to an extensive grant of mandatory authority to FEA to collect and verify the data. BOM is now using this mandatory authority for the joint petroleum reporting system.
- Credibility of published statistics. This is a complex problem not unrelated to the ability to compel responses and to conduct an independent audit of the data. Credibility is endangered if those involved in the collection and factual reporting of results are not in some way independent of the Federal Government's energy policymaking establishment, since some people are concerned that the published results may be biased to support a particular policy point of view. The Energy Conservation and Production Act established the Office of Energy Information and Analysis (OEIA) as an independent arm of FEA and stripped its policy roles, based on the model of the Bureau of Labor Statistics within the Labor Department.
- Confidentiality. Confidentiality of company information has been cited as a problem leading to duplication of data collection activities. As stated by GAO, this refers to the fact that some agencies cannot disclose identifiable data to other agencies because of the

disclosure restrictions of their own laws or the Freedom of Information Act, or because confidentiality was pledged to companies in order to obtain the data. GAO suggests shifting the burden of proof to the respondent to demonstrate a competitive harm associated with disclosure for each data item reported.

- Timeliness. GAO has noted that the published data are not available on a timely basis for decisionmaking. While this may be true, an acceleration of publication would be accomplished only at the risk of inaccuracies to be revealed with after the fact verification of the data. Most data users are not well prepared for the revisions which might be necessary to achieve more prompt publications.
- Data definitions. A great deal remains to be done to improve the consistency of data definitions used by various agencies. This is not a question which can be easily resolved. It has to be addressed on a system-by-system basis. The Federal Interagency Council on Energy Information has a task force working on data definitions, but it will require extensive study and cooperation, and perhaps changes in law, to make significant progress here.
- Adequacy and completeness. Several areas have been identified above in which data are neither adequate nor complete. The most difficult aspect of this problem is to get agency policymakers to identify their informational requirements.
- Basic analysis. Finally, analysis of basic data must be separate from interpretation of the results for policy implications. In addition, several agencies analyze the same phenomena with different methodologies and come to different results. In long-term forecasting, FEA, ERDA, and BOM have modeling efforts which may be duplicative.

The current organizational arrangement, characterized by many Department and agency players, has created the need for a heavy dose of interagency coordination and cooperation. The activities of FEA, OMB, and the new Interagency Council are recent examples of such coordination, just as the Interagency Petroleum Statistics Committee was a decade ago. Cooperation is best exemplified by the various arrangements FEA has negotiated with BOM and FPC and the ERDA-USGS agreement described above. If no changes were made in the present organizational setup, those coordination activities would have to be more actively pursued.

The Energy Conservation and Production Act requires FEA, through the new Office of Energy Information and Analysis (OEIA), to examine the adequacy of every agency's energy statistics programs, to plan for a more adequate and integrated system with less overlap and duplication and to recommend improvements to agencies, the Energy Resources Council, and the President, and to report to Congress. OEIA does not have, however, any authority under the Act to tell other agencies what to do or not to do. The Office of Management and Budget has the necessary authority under the Budget and Accounting Procedures Act of 1950 (Section 103) to initiate the appropriate changes. Clearly, then, under the new law FEA and OMB must work very closely togehter.

The President has proposed legislation which, if enacted, would combine into a Department of Energy the Federal Energy Administration, the Energy Research and Development Administration, the Federal Power Commission, and components of the Department of the Interior and other agencies. There may be some beneficial effects of such a possible organization on energy information, since either of these plans would bring together the major energy data programs now separated among various agencies.

The generation of energy information requires that several functions be performed. Simply put, there is the function of defining informational requirements which comes from interpreting law and discussing the matter with policymakers, analysts, regulators, and the general public. The data collection tasks must be assigned to the different agencies which can do the job most accurately and efficiently. The data collection efforts must be coordinated as to subject matter, methodology, standards of definitions, and timeliness. The data must be put into systems, frameworks within which analysis can be made, and the analysis and modeling must be performed and the results disseminated to the users. Finally, the system of data collection and analysis must be monitored and evaluated against the changing information requirements of policymakers and other users. These functions must be performed whether in a decentralized or centralized system.

An examination of the present system points up some difficulties concerning the organization leading to possible organizational efficiencies in certain areas. First, energy policy determination is presently divided among many agencies which come together in many formal bodies. There are many different policy functions which are distinct, but it is clear that similar information is needed by people in different agencies and Departments. While it is always difficult to determine data needs in any programmatic area, energy policy is particularly fragmented. The Federal Interagency Council on Energy Information is attempting to bridge this gap, but without authority and resources it will take a long time. Under the new Energy Conservation and Production Act, the FEA's Office of Energy Information and Analysis will have expanded authority in performing this function; however, a centralization of policy authority in one agency could lead to a more coherent statement of informational needs and, perhaps, a better integration of these needs into a priority ranking.

Assigning data collection tasks in an efficient and nonduplicative way is difficult with so many agencies. OMB has sufficient authority to do this within the provisions of law. Although FEA has authority to collect all the data it needs, that agency, appropriately, prefers to rely on existing data collection systems whenever possible. In view of this environment, the degree of overlap and duplication in data collection is surprisingly small. Interagency agreements and reimbursable data collection efforts have been negotiated in many subject areas. These arrangements work; however, it has been difficult to work out the specifications for the agreements and reimbursements between agencies are not always reliable sources of funds for ongoing data systems. Locating the data users and the data collectors in the same agency would make communications easier and authority over data systems more direct.

Coordination is composed of a number of tasks. Consolidation of energy agencies would, on the one hand, locate the coordination function within the resulting department insofar as data responsibilities were consolidated, and intradepartmental coordination should be an easier task than interagency coordination. On the other hand, it will never be the case that all energy-related data would be centralized. Some important energy data are collected as parts of other programs (e.g., census of manufactures, consumer price index, consumer expenditure survey) and would not be included in a new energy department. Some interagency coordination would still be required, but major steps might be made depending upon which agencies were combined. One simple benefit would be that statistical budget requests for energy data would be developed in a coordinated way within one department—at present such requests are developed largely, although not exclusively, independently of one another. Another is that the authority for mandatory data collection could be used for more surveys than at present (e.g., BOM). Finally, confidentiality of data would be less of a problem than it is today, and policies could be devised for more efficient data sharing within a large energy agency.

While data collection is not as duplicative as one might expect, the analytical functions have proliferated. This is due to the reluctance of policymakers to rely on each other's analysis for decisionmaking. Even though they appear to be largely willing to use other agencies' data rather than to develop their own collection program, agency officials are more inclined to want to develop large-scale models for projecting energy balances into the future. It is not clear how many such models the Federal Government should maintain, but the number is very small given the high cost for model development and maintenance and the potential for public confusion given different results. Yet with the current fragmentation of responsibilities there is a tendency to overinvest in analytical capacity. Significant improvements could be made by centralizing policymaking authority within one department. It is possible that duplicate analytical capacities could be found even within existing agencies.

Finally, the monitoring and evaluation of statistics is difficult. For one reason, it is difficult for one agency to monitor and evaluate the program of another agency, although the Energy Conservation and Production Act (ECPA) requires FEA to do just that. Under ECPA the evaluation will not necessarily lead to improvement since the data systems being evaluated may fall outside of FEA. If FEA and the other agencies mentioned prominently in this chapter were merged into one department, the evaluation would have some teeth and there would be less motivation to have differing results.

These potential benefits to reorganization in the direction of consolidation of energy statistics agencies have been described in general terms. For one reason there would have to be a great deal of effort invested before one could say for sure which particular agencies should be included in a new energy department including the drawbacks of any such plan. For another, the consolidation of energy information functions would not and should not be the major factor determining the make-up of any proposed new entity.

The discussion of the possible steps toward developing timely, integrated energy statistics through reorganization is not intended to be an indictment of the present system. Indeed, while there are some overlapping programs and while coordination and planning is more difficult with many agencies involved, the present system works surprisingly well. Under the present organization, improvements are being made every day. People of good will are striving to make the system work. In addition, the creation of a large department consolidating all energy functions would not, in and of itself, solve all of the problems cited by the GAO. The assurance of timeliness, credibility, data definitions, adequacy and completeness are difficult problems under any organizational structure. Also, some problems could just as easily be addressed in ways other than organizational changes. Thus, mandatory reporting can be transferred between agencies in some cases, and timeliness is a goal of any good statistical program.

There are some measures which could improve the energy data system which fall short of creating a new consolidated department of energy or of energy and natural resources. A first step was taken with the creation of the Office of Energy Information and Analysis at FEA. This Office is, by law, organizationally separate from the policy development functions of the agency, lending organizational support to the credibility of the data and reports (Project Independence and National Energy Outlook) produced. Similarly, the law vests FEA with coordination responsibility. While similar authority also rests with OMB, FEA has staff to carry it out.

A second step could be taken under present conditions. For planning and coordination to be effective, staff and other resources as well as a focal point must be available. The Federal Interagency Council on Energy Information is an important and productive interagency body which, nonetheless, relies on agency good will and staff to carry out its mission. Both of these resources are in limited supply. One alternative, to lodge this function in FEA or in some other agency, could be viewed as placing too much power in one operating agency over the operations of others. Alternatively, affiliation with the Energy Resources Council as a subcommittee was rejected by the Inter-agency Council as insinuating too close a relationship between energy policy and energy statistics. An alternative approach would be to locate such a group within the Executive Office of the President which has authority over all agencies and is viewed by most as an honest broker. Whatever the organizational arrangements of operating agencies and location of a coordinating body, that body would need a permanent staff and authority to enforce final decisions.

Finally, program and system-wide planning and monitoring requires a central agency with overall responsibilities. OMB has broad authority in the Budget and Accounting Procedures Act. It also has another tool which is crucial to this mission, and that is the reports clearance function. Mandated under the Federal Reports Act of 1942, reports clearance is designed to reduce reporting burden and duplicative data requests by requiring each agency to submit proposed survey questionnaires to a central clearing agency for approval before use. This authority is also very important to the planning, coordinating, and monitoring functions mentioned above. In 1973, however, the Federal Reports Act was amended to require independent regulatory agencies (including FEA and FPC) to submit their reports to GAO while the other agencies (e.g., BOM, USGS, and Census) submit their requests to OMB. While OMB and GAO attempt to communicate with each other, it is clear that this split responsibility is counterproductive. We can live with a decentralized data collection and analysis function, but only if the coordinating function is centralized and strong. The Federal Reports Act responsibilities for independent regulatory agencies should be restored to OMB. GAO has testified to the correctness of this step as recently as March 1976. Without a unified clearance responsibility, the opportunities for effective interagency planning and coordination for energy statistics are severely limited. This action would be necessary

even if all energy agencies were consolidated into one department, since some energy functions with their associated data needs would not be included in the consolidated energy agency.

EDUCATION STATISTICS

Introduction

The functional area of education statistics encompasses a broad range of data collection, analysis, and utilization activities. A commensurate number of Federal agencies [1] are involved in varying degrees in the development and use of statistics concerning: the condition of education in the Nation; the analysis of current education practices and delivery systems; the funding, management and evaluation of federally supported education programs; and the development of new techniques, services, and support systems for the U.S. educational system.

Responsible Agencies

The National Center for Education Statistics (NCES) is the general-purpose Federal statistical agency responsible for collecting, analyzing, and disseminating statistics about education. NCES is charged with the tasks of producing base line statistics, and of analyzing and presenting these data to describe the condition of education in the United States. Although primary analysis, including tabulation of data and preparation of descriptive narrative, is conducted within NCES, the specific task of policy interpretation of the information collected rests with the Office of the Assistant Secretary for Education, and with the Office of the DHEW Assistant Secretary for Planning and Evaluation.

The Office of Education (OE) has primary responsibility for accumulating information on the administration and impact of federally supported programs. These data comprise a substantial portion of the education statistics obtained through current Federal information collection activities. Responsibility for the collection of program specific data is spread throughout the various components of the Office of Education, including the Bureau of School Systems, the Bureau of Education for the Handicapped, the Bureau of Postsecondary Education and the Bureau of Occupational and Adult Education. In addition, the Office of Planning, Budgeting, and Evaluation (OPBE) within the Office of Education is responsible for the collection of information required to evaluate the effectiveness of specific Federal education programs in terms of their impact on the educational system. OPBE also prepares a comprehensive annual evaluation report on federally supported education programs.

The National Institute of Education (NIE), the third major component of the Education Division, is responsible for research on long-range issues in education. To meet this objective, NIE employs a variety of strategies, including the collection and analysis of data specific to the development, testing and implementation of new education techniques, services, and delivery mechanisms. In addition, NIE shares with NCES and OE the responsibility for meeting the requirements of certain congressionally mandated studies.

A number of other Federal agencies responsible for the administration of programs affecting the educational system gather and use data to measure the impact and effectiveness of activities under their purview. Such programs include, on the one hand, regulatory activities of the Office for Civil Rights and the Equal Employment Opportunity Commission, which are designed to ensure equal access to educational services and equal opportunity for employees of the educational system and, on the other hand, grant programs which provide funds for the delivery of specified services to students. In the latter category, examples include the school breakfast and lunch programs of the Department of Agriculture; the Headstart program of the DHEW Office of Child Development; the graduate student support programs of

[1] Although a number of private organizations and associations produce national education data (e.g. College Entrance Examination Board—data on intelligence and achievement of high school senior applicants to college and college senior applicants to graduate school; American Council on Education—longitudinal data on college students; and National Education Association—data on teacher characteristics), the discussion in this paper focuses on the federally sponsored education statistics programs.

the National Science Foundation, the National Institutes of Health, and the National Endowment for the Humanities; the support for schools on Indian reservations of the Bureau of Indian Affairs, Department of the Interior; the institutional certification programs of the Veterans Administration; and various educational programs sponsored by the Department of Defense.

Finally, there are at the present time certain general-purpose education statistics gathered by agencies outside the Education Division. The Bureau of the Census collects elementary and secondary school system financial statistics as part of the census of governments and statistics on school enrollment and educational attainment in the decennial census, as well as in the October and May Current Population Surveys. Data on students and teachers, particularly in the science and engineering fields, are collected by the National Science Foundation. The Bureau of Labor Statistics gathers information on manpower as well as on certain aspects of vocational education. Data on the intelligence and achievement of children aged 6–17 years are collected on the Health and Nutrition Examination Survey conducted by the National Center for Health Statistics, and statistics on health education institutions and students are collected by the Bureau of Health Manpower.

Major User Groups

Federal education statistics which have evolved over an extended period in response to a wide variety of needs, have been developed primarily to serve users at the Federal/national level. The general statistics program of NCES provides recurring information on the finances, students, staff, and facilities involved in or devoted to the education of the Nation's youth and adults. More recently initiated longitudinal and cross-sectional studies have contributed to developing an understanding of the progress and achievement of students in the educational system. These base line data are complemented by information made available from the program and evaluation offices dealing with the impact and effectiveness of specific Federal initiatives.

On the executive side, both base line and program statistics are used by policy analysts and program developers within the Education Division and the Office of the Assistant Secretary for Planning and Evaluation to determine the size of various populations to be served, recommend alternative programs for the financing of the educational system and tuition support for individuals, and assess changes in the population which may affect the education delivery system.

On the legislative side, general statistics as well as program specific information are used by members and staff of the Congress to assess current programs, to draft new or revised legislation, and to modify administration proposals. Congressional committees which make use of these data include: the Committee on Education and Labor of the House (including the Subcommittees on Elementary, Secondary, and Vocational Education; Select Education; Postsecondary Education and Equal Opportunities); the House Appropriations Committee-Subcommittee on Labor-Health Education, and Welfare; the Senate Committee on Labor and Public Welfare-Subcommittee on Education; and the Senate Committee on Appropriations–Subcommittee on Labor; Health, Education, and Welfare. The Congressional Budget Office uses federally developed education statistics to plan expenditures, while the General Accounting Office uses such information to evaluate the effects of specific legislation, such as the impact of a tax deduction for college expenses.

In addition to the numerous Federal government users, there are many national associations whose members regularly employ data gathered through the Federal Statistical System as a basis forassessing the current status of educational services and recommending legislative or programmatic changes. Although the list is far too long to cite in its entirety, some key examples will serve to illustrate the scope and nature of these organizations. Major organizational users include the National Education Association, the American Council on Education, the Council of Chief State School Officers, the State Higher Education Executive Officers Association, the Research Council of the Great City Schools, the American Association of School Administrators, and the Council for American Private Education.

Representatives of these groups have demonstrated increasing interest in working with the National Center for Education Statistics to ensure that priority needs for data are incorpo-

rated into the Federal Statistical System, to improve the information available, and to eliminate the need for the associations to seek statistics independently, at the cost of duplicating Federal efforts.

Adequacy of the Education Statistics Program

NCES is mandated [2] to document statistically the condition of American education, to prepare special analyses of such statistics, and to assist State and local education agencies in developing and implementing standardized statistical systems. The core program of the Center includes the collection of data on elementary/secondary education, postsecondary education, educational manpower, and libraries.

Elementary/Secondary Education.—The Elementary-Secondary General Information System (ELSEGIS), initiated in 1969 and conducted annually, is the primary instrument for acquisition of quantitative data on the pupils, staff, finances and facilities in public elementary and secondary education in the United States and outlying areas. The Elementary/Secondary Common Core of Data, a proposed census of local school systems, intermediate education agencies, and State education agencies, is currently being developed by NCES for full-scale implementation in the 1977–78 school year. It has been designed to replace ELSEGIS and to provide improved data for education planners, administrators and researchers. Implementation of the Common Core of Data, which is central to the improvement of the Center's base line statistics on elementary and secondary education, must include substantial technical assistance to the data producers. Once installed, the program should be subjected to careful evaluation to determine the utility of data being collected, the necessity for universe coverage of school districts, and the need for annual collection of all data elements. Differences in state and local recordkeeping systems which affect the quality of the data provided should be documented and assessed; efforts should be made to develop mechanisms for adjusting State level data as necessary to produce accurate national totals and interstate comparisons.

Complementing the general statistics base now acquired through ELSEGIS are additional NCES activities designed to obtain fuller data on elementary and secondary education. Chief among these studies are: a survey of nonpublic elementary and secondary school enrollments, staff, and finances; a survey of preprimary enrollments of children under six; and a series of studies concerned with the financing of public schools, which includes periodic surveys on expenditures for public elementary and secondary education and statistics of local public school systems' finances.

National Assessment of Educational Progress.—Efforts by NCES to measure the outcomes of elementary-secondary education, as contrasted with various enumerations concerning educational institutions and participants, are concentrated in the National Assessment of Educational Progress (NAEP). NAEP is an annual survey of the knowledge, skills, understandings and attitudes of selected groups of young Americans. The project focuses on two main questions: (1) What is the educational attainment of various population groups in major school-related subject areas? and (2) What are the changes in attainment over time, if any, in these areas? More recently, NAEP has been modified to incorporate the collection of data concerning the mastery of basic life skills and knowledge. To enhance its potential utility for users at all levels of the educational system, NAEP has: (1) extended efforts to interpret findings; (2) increased the number of background variables being collected; (3) expanded technical assistance to State and local education agencies using NAEP materials and methodology; (4) increased efforts to provide comparative data or "derived estimates" for use with State and local "piggybacks" of the assessment; and (5) involved numerous organizations, groups, and individuals in examining present and future directions of the national assessment.

The Center's evaluation of the NAEP program should continue efforts underway to determine the users of the data, and the uses made of the information for Federal/national policy development. Based on the results of this evaluation, the program should be streamlined to reflect national data needs. In particular, greater emphasis should be given to measuring functional abilities of the population (in contrast to assessments of subject area knowledge). It is further recommended that priority be given to measuring the abilities of individuals who have

[2] Public Law 93-380, The Education Amendments of 1974.

completed their educational experience to determine whether those who have left the education system are equipped to function in society. Efforts to assess the benefits of combining the NAEP program with the center's National Longitudinal Study should be continued by NCES.

Postsecondary Education.—Central to the postsecondary education statistics program of NCES is the Higher Education General Information Survey (HEGIS), which systematically collects institution-based, quantitative data on the Nation's colleges and universities, including community and other two-year colleges. Annual surveys acquire basic information on the number of students and selected characteristics of institutions, students, staff, financial structure and operations. Data collected on other than an annual basis include information on student residence and migration, institutional libraries, and physical facilities.

The nature of postsecondary educational opportunities, and the patterns of student participation therein, have changed significantly in the past decade. Federal education statistics have not, as yet, adequately adjusted its data collection, analysis and dissemination programs to reflect current and future issues, nor has it undertaken a comprehensive effort to develop a common core of data for postsecondary education to complement the program under development for elementary and secondary education. Analyses of changes in the information reported from year to year should be conducted on the specific data items in the HEGIS surveys to determine the needed periodicity and coverage for the information being collected. In particular, the need for annual, universe coverage of opening fall enrollment and earned degree data should be studied; the use of sample data to provide estimates for these indicators in alternate years should be considered. In addition, a study of the uses and users of HEGIS data should be undertaken to assess the relevance of the information collected and the publications disseminated. It is anticipated that such a study would lead not only to recommendations for the elimination of particular data elements (for example, information on facilities construction is expected to be less important in the absence of Federal support programs) but also to proposals for new items which should be collected (for example, data on facilities renovation is needed to determine the scope of problems anticipated as a result of the need to conserve energy as well as from inadequate renovation programs in past years). In alternate years, NCES should substitute for its institution-based HEGIS survey of staff an individual-based survey of faculty to obtain needed data on faculty salaries, tenure, mobility and other items which cannot be obtained through the current system and are required for the development of national policy with respect to the support of teacher education.

In addition to HEGIS, the postsecondary statistics program of NCES currently includes: the National Longitudinal Study of the High School Class of 1972 (NLS); surveys in noncollegiate postsecondary career schools; and statistics on adult and continuing education. NLS provides data on the extent to which career plans and aspirations persist over time and are eventually fulfilled or thwarted; the characteristics and abilities of those choosing various kinds of postsecondary education and occupations; the impact of Federal funds on initial educational plans, on perseverance of intention and on success; and the extent to which educational experiences have prepared youth for work. The individual experience and outcome data which are provided through the NLS constitute a valuable resource for educational planning. Priority should be given by NCES to the funding of a new cohort, so that changes in experiences and outcomes which have been affected by changes in economic conditions and educational alternatives may be assessed. In addition, as noted earlier, consideration should continue to be given to merging selected NLS data with information from the NAEP study.

The program of surveys in noncollegiate postsecondary career schools is currently focused on the collection of data to provide national estimates of vocational program enrollments by program, sex, race/ethnic group, full-time/part-time status, and completions and noncompletions. A survey of the characteristics of students in noncollegiate postsecondary schools will provide data on the socioeconomic characteristics and on education and work experience of participants, as well as on the students' reasons for school and curricular selections and plans for the future.This survey, which will provide needed information for planning Federal student aid program support levels, should be pursued on a recurring basis to complement HEGIS data and fill a serious gap in the postsecondary education

statistics program. NCES should ensure that the proprietary schools, which comprise a significant portion of the postsecondary institutions, are included in all phases of the noncollegiate postsecondary surveys.

The Adult and Continuing Education Statistics Program is designed to develop a base of information on what has been described as the most rapidly growing segment of education in America. Through a series of triennial surveys of individuals, trend data are provided on the extent to which adults are participating in educational programs, their activities, and related socioeconomic information. This survey series is supplemented by information on adult education provided by the program sponsors, including colleges and universities, community agencies, public schools, and correspondence schools. The costs of participation in adult programs, as well as the sources of funds used by the participants who enroll for various purposes, should also be ascertained by NCES in its adult education studies for use in planning student aid programs. Further studies of adult and continuing education should allow for concrete analysis of participation by purpose.

Education Manpower.—Training, work situations, and job markets for teachers are undergoing major changes. In response to the requirements of the Education Amendments of 1976, NCES will increase its efforts to conduct surveys on the supply and demand for education personnel. Studies which are currently underway on preservice education and recent college graduates will provide some of the data needed on teacher supply. The survey of recent college graduates will be conducted on a recurrent basis to provide information required to monitor the supply of teachers.

Studies of teacher collective bargaining will provide data on the numbers and kinds of teacher collective bargaining agreements and on teacher work stoppages. In addition, NCES is sponsoring work on the development of a model teacher collective bargaining information system for use by all parties engaged in negotiation at the local level. While data to implement the system must be assembled by the interested parties, NCES will provide the model to facilitate use of the data. Consideration should be given by NCES to expanding this effort to the area of higher education, where collective bargaining is an emerging phenomenon.

The proposed package of studies on education personnel will contribute to filling a serious gap in information needed for national policy with respect to the support of teacher education programs, and will serve as a starting point for examining the problems and repercussions of the new and growing trend in teacher unionization. While the proposed program of education personnel surveys constitutes a significant step in meeting the need for information on teacher supply, it should be noted that such data will fall short of its potential utility if complementary data are not obtained for the demand side of the equation. It is therefore proposed that NCES include in its common core of data from school districts adequate information to assess the current and future demand for teaching personnel. Consideration should also be given to expanding the personnel supply and demand information collection to the area of postsecondary education.

Library Statistics.—The Library General Information Survey (LIBGIS) collects systematic data on virtually all types of libraries in the United States. Information on resources (both print and nonprint media), expenditures, staffing, facilities and hours of services has been collected on public school libraries/media centers, public libraries, and college and university libraries. Arrangements are currently being completed for the collection of complementary data which will round out the statistics on library resources. Included will be a Survey of Library Cooperatives, Consortia and Networks; a Survey of State Libraries and State Library Agencies; and a Study of Libraries Serving Commerce and Industry. While the relative level of effort expended by NCES on library statistics is not substantial, the need for the expansive current and proposed program of library statistics has not been adequately justified in the face of unaddressed, competing priorities. It is recommended that a study of the uses and users of the information gathered on libraries be conducted as a basis for determining appropriate levels of effort to be expended and types of data to be collected on the role and contribution of libraries to the educational system.

Other Education Statistics.—Beyond the data collection and analysis activities cited above, which are wholly the responsibility of NCES, the Center is also cooperating with other units of the Education Division and DHEW on major studies

of the bilingual population, the educationally disadvantaged and the handicapped youth. These broad initiatives have been mandated by the Congress during the last three years. The congressional requirements for data representative of individual local education agencies call for a significant increase in the collection and analysis of base line statistics on groups in the population which are the primary targets for federally assisted education programs. The collection of population statistics (in contrast to institution-based statistics) represents an important opportunity for the Center to shift its emphasis from being basically a recorder of historical information to becoming an important participant in educational policy formulation at the Federal/national level. NCES must ensure that adequate staff resources are committed to the design of these population studies, and to the analysis of resultant data which will influence the nature and scope of Federal program initiatives.

Complementing the data on higher education collected by NCES is the information gathered by the National Science Foundation (NSF) on the students, staffing and financing of postsecondary programs for scientists and engineers. The Division of Science Resource Studies within the NSF Directorate for Scientific, Technological and International Affairs has as its primary objective the development of factual and analytical information to provide the basis for national planning and policy formulation in the area of science and technology resources.

The college and university portion of the studies on funding of scientific and technological activities includes three surveys which are conducted annually. These are:

The Survey of Graduate Science Student Support and Postdoctorals, which is designed to secure up-to-date information on graduate enrollments in science departments and on the sources of support for such enrollees;

The Survey of Scientific and Engineering Expenditures at Universities and Colleges, which provides data on total as well as Federal research and development expenditures by field of science and source of funds; and

The Survey of Scientific and Engineering Personnel Employed at Universities and Colleges, which collects data on scientists and engineers by employment status, field of science, type of activity, highest earned degree, and sex. Separate data, by field and type of activity, are requested for technicians employed in the sciences and engineering.

As currently designed, these studies appear to be both excessive and inadequate. On the one hand, it is questionable whether the annual, universe collection of information continues to be necessary. An analysis of changes in the statistics over time (i.e., from year to year) should be conducted to determine the necessary periodicity and coverage for this program of studies. On the other hand, these studies, when conducted, should be expanded to include more complete information on part-time students of science and engineering. Further, NSF should conduct a study to determine the effect of the current practice of obtaining information only on the student's major source of financial support, in contrast to requesting more detailed data on the multiple sources of funding which most participants appear to use.

The NSF program of studies on the development and utilization of scientific and technical manpower includes:

The Comprehensive Doctorate Roster, which is maintained by the National Academy of Sciences through biennial surveys to provide data on the number and characteristics of new doctorates awarded in specific fields;

The National Sample of Scientists and Engineers, which is conducted by the Bureau of the Census on a biennial basis to obtain basic information on scientists, including employment status and specialty, years of professional work experience, postdoctoral support, and other characteristics; and

The Survey of Recent Scientific and Engineering Graduates, which collects data annually on the employment of scientists and engineers in industry by field and work activity.

Related to the NSF program of manpower studies is the Doctorate Awards Survey carried out by the National Academy of Sciences. This survey collects and develops the primary data base for the maintenance of the Doctorate Record File.

Complementing the NSF program of recurring surveys is the Higher Education Panel, which is jointly supported by the National Science Foundation, the Office of Education, and the National Institutes of Health. The Higher

Education Panel, which is designed to provide early measures of change through quick response sample surveys, has sponsored studies of enrollments, research activities, faculty, and a number of other subjects.

The Health Resources Administration, like NSF, is mandated to collect and disseminate data on a limited segment of the educational system, namely, the area of health education. Although the Bureau of Health Manpower has supported public health education for more than twenty years, a systematic approach to the specification and collection of data to plan, administer, and evaluate the Federal effort has not existed. With the passage of Public Law 94-484, the Health Professions Educational Assistance Act of 1976, recognition was given to the continuing inadequacies in the area of health education data. To address these needs, the act specifies that the Secretary, in cooperation with the National Center for Health Statistics, shall be responsible for the continuous development and dissemination of nationwide statistics on public health manpower, including educational requirements, the cost of training and, as needed to calculate surpluses and shortages of manpower, current and trend data on educational program outputs by types of specialists within the general field of public health. The Bureau of Health Manpower, which is responsible for administering the bulk of Federal programs assisting in the production of health manpower resources, has the lead responsibility within the Health Resources Administration for developing a program to meet the needs for health education information. The plan which is now under development will build upon ongoing data collection mechanisms, including cooperative relationships with professional associations for the collection of institutional and individual student data, programmatic reporting which yields aggregate statistical information, and the Bureau's program of periodic and longitudinal studies, to produce a more systematic approach to the collection of health education statistics. Joint working relationships between the Bureau of Health Manpower and the Education Division of DHEW should be continued as planning and implementation of this system proceeds. While it does not appear appropriate to have this major data collection program assumed by NCES, every effort should be made to coordinate activities so that compatible and nonredundant systems are developed.

In addition to the information provided through the core programs of general education statistics described above, significant data on the educational status of the population are provided through household surveys of the Bureau of the Census. The Current Population Survey October supplement annually produces national statistics on the number of pupils in nursery school, kindergarten, elementary school, high school, and college. Characteristics of the students, including age, sex, race, income of family, employment of parents, employment of student, region of residence, and other social background factors, are derived from the survey. In addition, this is the only national survey which provides reliable data on the characteristics of persons eligible for school who are not currently enrolled. These surveys provide, by their consistency from year to year, measures of trends in high school drop-out rates; characteristics of students in college and the income and education of their families; and school participation rates of age, sex, and ethnic groups. Data from the October CPS, which provide the only reliable national estimates of the income for families with college-age dependents, have been used, for example, to predict the number of applications for the Basic Educational Opportunity Grants program, and to evaluate the effects of the grant program on enrollment in colleges. The annual March CPS supplement provides reliable data on the income, occupation, employment, and family characteristics of persons by years of school completed. Reports from this series are useful for analyzing the trends in income levels or occupational achievement of specific education-age groups, and for measuring shifts in attainment levels of various ethnic groups. The decennial census also provides data on education based on questions regarding whether a person was enrolled in school, grade enrolled in, grade completed, and whether a vocational course was completed.

Substantial data on federally supported programs and activities are collected and analyzed by component units of the Office of Education. Certain planning, administrative and evaluation reports concerning the populations to be served and benefit recipients are required by OE in each of its more than one hundred programs. The statistical data requirements of Federal program applications, and fiscal and performance reports represent a major portion of the information burden in elementary and secondary educa-

tion. Considerable overlap exists in the data required by each of the programs. The Assistant Secretary for Education should require a review and analysis of program applications and administrative reports to determine the core set of elements required of applicants and beneficiaries. Based on this assessment, the Education Division should attempt to develop a consolidated data base for Federal program statistics to complement the general statistical core being implemented by NCES.

The studies conducted by the Office of Planning, Budgeting, and Evaluation are intended to provide an assessment of the effectiveness of federally supported education activities through a series of statistical surveys yielding data on the impact of Federal intervention. OPBE evaluations vary in their design from program to program, attempting to come as close as possible to a true experimental design when to do so would not disrupt the program's delivery mechanism. Hence, in some cases the evaluations are carefully controlled, experimentally designed studies, while the majority take the form of much broader surveys. OPBE should assess the utility of its approach to Federal program evaluation, and consider reorienting a portion of its efforts to the conduct of smaller scale, experimentally designed studies of the effectiveness of Federal program interventions. In order to minimize the burden on respondents, needs for national statistics on the impact of Federal programs should be coordinated and consolidated, where possible, with the core data base recommended above.

Recommendations

To improve Federal education statistics, it will be necessary to implement changes which go beyond the specific modifications to ongoing efforts recommended in the discussion of the adequacy of the current program. These changes are concerned with needed improvements in education statistics planning and coordination, and with the development of data systems to fill important gaps in the information needed for national policy and planning purposes.

Prior to 1974, the only organized advisory committee to address education statistics planning was the Subcommittee on Statistics of the Federal Interagency Committee on Education, a group comprised totally of Federal agency representatives. At that time, the subcommittee served primarily to review the plans of NCES and to recommend priorities among the alternative statistical activities proposed by the Center. In the recent past, the FICE subcommittee has been inactive.

In response to requirements set forth in the Education Amendments of 1974, NCES has established a consortium of Federal agencies to improve the sharing of education statistics. The Federal Interagency Consortium of Users of Education Statistics, which has members representing more than 30 Federal agencies and congressional committees, has concentrated its efforts on amassing data systems produced by the constituent agencies. This effort to identify existing data bases and improve their dissemination will improve interagency utilization of independently designed systems, but is not expected to serve as a resource for the planning of education statistics or the identification of informational needs.

The Education Data Acquisition Council (EDAC) was instituted in 1975 as an internal vehicle to prepare the Education Division's Annual Data Plan. Under the Education Amendments of 1976, the responsibilities of EDAC were formalized, and its role was expanded to include review of the education data systems of the DHEW Office for Civil Rights. To fulfill its role, EDAC is expected to "develop, approve and disseminate standards, justification criteria and guidelines for the planning and development of a sound body of National education data," and to be responsible for "recommending the inclusion or exclusion of data surveys or reporting systems in the Plan." EDAC initiatives are currently concentrated on the development and application of criteria and standards to assess the need for studies proposed by component units of the Education Division and the Office for Civil Rights. While this is clearly an appropriate course for the near term, EDAC should, in the longer run, serve as a clearinghouse for all federally sponsored data collection activities which are directed primarily to education respondents. This process should be phased in over a period of years, starting with the inclusion of requests from other parts of the Department of Health, Education, and Welfare, and expanding at appropriate intervals to other agencies and Departments of the Federal Government. In addi-

tion, EDAC should play a key role in working with the interagency effort recommended below to identify education informational needs. The judgments made by EDAC of the importance, relevance, and appropriateness of data collection activities proposed by Federal agencies would benefit greatly from the existence of an overall plan of needs and priorities for education statistics.

The Advisory Council on Education Statistics, mandated by Public Law 93-380 and formally established late in 1975, represents the first broad-based external committee to provide advice and counsel to NCES. Comprised of representatives of the public and the Federal Government, this group is responsible for reviewing general policies for the operation of NCES as well as for recommending standards to ensure the high quality and apolitical nature of NCES' statistics and analyses. Initially, the Advisory Council was involved primarily in briefings on the programs of NCES. More recently, the Council has begun to concentrate its efforts on specific issues including such areas as the role of of a general-purpose statistical agency and demands for data placed upon it from congressional mandates, Federal needs for program and compliance data, and the needs of user groups for comparable trend data.

Finally, the Chief State School Officers' Committee on Evaluation and Information Systems (CEIS) has served since 1972 to advise Federal agencies on proposed surveys. The CEIS role has been primarily to question the need for various Federal reporting requirements and to assist survey designers in locating the most appropriate data sources. More recently CEIS has been involved in the cooperative development of an improved data base for elementary/secondary education and in the planning of appropriate forms of information systems assistance to State and local agencies. Efforts to institute an analogous advisory committee for postsecondary education statistics have recently been initiated by NCES.

The fact that there has not been until very recently a formal policy group to advise on the development of even a portion of Federal education statistics should be underscored. Coupled with this lack has been an ever increasing demand for information on the educational system from concerned Members of Congress, DHEW policymakers, Federal program managers, educational associations and the public. Education statistics have been a "free good" in the eyes of the requesters, while at the same time resources for meeting competing demands have been limited. The result has been two-fold. On the one hand, those who must determine priorities have experienced substantial difficulty in framing a responsive and timely program. On the other hand, data providers at the State, local and institutional levels, whose needs have not been systematically addressed in the development and execution of Federal education statistics, have become increasingly suspicious of the need for and utility of information which must be collected at their expense. Similarly, members of the research community, who have been served only if their needs have been met coincidentally by data collected for Federal purposes, have become increasingly vocal about the inadequacies of the information produced.

Within the Education Division, there is no single authority responsible for planning and coordinating the development of a comprehensive, policy-oriented program of Federal education statistics. Each agency has collected information and conducted analyses according to its own plan. This arrangement has fostered fragmented data collection efforts and simultaneously has resulted in inadequate coverage of important issue areas. The need for a coordinated identification of Federal education information requirements is further compounded by the fact that a number of Federal agencies outside the Education Division, and outside the Department of Health, Education, and Welfare, play a fairly substantial role in the collection and analysis of education statistics. An interagency effort should be established to develop an overall specification of the needs for Federal education statistics; to continuously assess the programs in operation; to formulate plans for improved interagency cooperation in the production of needed data; and to recommend discontinuation of outdated programs, development of new activities, and appropriate assignments of responsibility for the collection of education statistics. Such an effort should be concentrated on the overall data plans and strategies of the various operating units; detailed development of specific data collection activities should continue to be the responsibility of the sponsoring agencies.

Given the current breadth of agencies involved in the production of Federal education

statistics, it is somewhat difficult to recommend a focal point for this interagency effort. While EDAC might appear to be an appropriate mechanism for this task, it seems more reasonable, for the foreseeable future, to establish an alternative vehicle to meet the needs specified. The immediate Office of the Assistant Secretary for Education may well be the most logical locus of responsibility for leadership of the proposed interagency effort. The activities of EDAC, which should continue to be concentrated on the review functions discussed above, should be systematically coordinated with the efforts of the needs identification group. It is imperative that adequate staff resources be committed, both within the Education Division and across Federal agencies, to the proposed interagency effort to assess the current status of education statistics, determine priority needs to be met, and establish intra- and interagency responsibilities for the collection of needed data. Provision should be made to obtain systematic input from analysts and users regarding data needs; to establish mechanisms to determine priority needs and/or users to be served; and to conduct objective periodic external assessments of the education statistics program. The operation of improved data planning and coordination mechanisms should result in:

Assignment of adequate staff for planning to systematically surface user needs and investigate alternative methodologies for meeting demands;

Systematic review of existing data collection activities, including quantitative assessment of the use made of data currently obtained, to serve as input to the streamlining or elimination of ongoing programs;

Increased coordination with other Federal agencies to ensure that data producers and users capitalize on existing surveys and that data gaps are filled in the most expeditious manner; and

Expansion of data analysis activities, to capitalize on data collected and gain improved insight for recommending changes in the education statistics program.

Important Gaps in Education Statistics

Despite the seeming expansiveness of the current and planned education statistics program at the Federal level, important gaps exist which must be filled if the system is to serve policy and planning needs at the national level. To meet these needs, there must be a systematic effort to design and implement a program of Federal education statistics which studies educational inputs, processes and outcomes.

Five gaps which have been identified are discussed below. While this list is clearly not exhaustive, it will serve to illustrate some of the shortcomings of current Federal education statistics.

Assessment of Alternative Educational Treatments.—A disproportionate level of effort is currently being expended on the collection of data concerning inputs to the educational process. Few resources are currently being devoted to the collection of information on the specific services delivered to students, the alternatives they may select, or the effects of exposure (or lack of exposure) to varying types of educational processes or treatments. While program development is primarily the responsibility of local and State administrators, the Federal Government should devote more resources to obtaining information needed to structure and fund effective educational interventions.

Educational Outcomes Data.—Coupled with the lack of educational process data is the dearth of information on the outcomes of participation in the educational system. The National Assessment of Educational Progress and the National Logitudinal Study represent modest efforts to measure the knowledge of the population and educational outcomes for selected samples of students. The investigation of outcomes, based on individual data rather than institutional information, must be substantially strengthened if any national policy is to be made concerning the relative costs and payoffs for alternative educational experiences. Similarly, population data must be strengthened to ascertain the unmet needs of the out-of-school population, including both those who have been excluded from participation by virtue of physical, mental or socioeconomically handicapping conditions as well as those who have rejected the opportunities offered by "dropping-out" of the educational system.

Information on the Cost of Education and the Financial Health of Education Agencies and Institutions.—Given current and anticipated economic trends, the costs of education programs and the sources of support for the student and for the education agencies and institutions must be more thoroughly examined. The relationship

of sources and amounts of funds available to the schools and schools systems to the patterns of educational expenditures should be assessed as a basis for determining Federal policy with respect to the funding of education at the elementary-secondary and postsecondary levels.

The Role of Private Industry in Education.—Increasingly, private industry is becoming involved in the provision of education and training through direct support for students' attendance at institutions as well as through the provision of industry-sponsored training programs. As a starting point, base line statistics should be gathered on the extent to which private industry is supporting various kinds of educational experiences. In particular, the types of courses being sponsored by industry, and the reasons for the establishment of such training programs as alternatives to the services provided through public and private institutions, should be examined. These data are needed to assess perceived weaknesses in the relevance of institutional education and training and to formulate possible recommendations for change.

Occupational Demand-Education Supply Analysis.—Much of the data needed to address the issue of the "fit" between the products of the educational system and the demand for individuals trained in various occupations already exists. Increased effort should be devoted, however, to improved coordination of this information, and to the analysis of the information to suggest needed changes in emphasis, particularly in the area of noncollegiate postsecondary education. In the absence of such analyses, there can be little expectation that the educational system will be responsive to the needs of the economy.

Statistical Resource Allocation

Over the past decade, the Federal agencies have concentrated on the collection of education statistics. Despite the fact that more data must be obtained, and will continue to be needed, there must be a shift in the balance of statistical resource allocation from data collection to data standards implementation, data analysis, and data dissemination. If the current neglect of these statistical support activities continues, the education statistics activity of the Federal Government, which rests in large part on the voluntary cooperation of its respondents, will collapse. Staff and financial resources must be diverted from data collection activities to planning, coordination, technical assistance, analysis, and dissemination efforts, at the expense of amassing less information, but in the interest of building and maintaining viable, usable and used Federal education statistics.

Summary

Recommendations for changes to the education statistics programs have been offered throughout the body of this chapter. These recommendations are summarized briefly below.

Modifications to Existing Programs.—As an integral part of the development of the Elementary-Secondary Common Core of Data, NCES should design methods to ensure inter-State comparability of data. Following implementation and analysis of the Federal core data, NCES should study the impact of collecting the information on a sampling basis rather than on a complete census basis, and on a periodic basis less frequently than annually.

The Federal/national policy uses and users of the National Assessment data should be ascertained, and should form the basis for adjustments to the NAEP program. Consideration should be given to placing a higher priority on the assessment of functional abilities, particularly in the out-of-school population.

Year-to-year changes in the data reported should be analyzed as a basis for determining the needed coverage and periodicity of surveys of postsecondary institutions. An analysis of information users and uses should be conducted to determine changes which should be made in postsecondary data sets. The possibility of collecting individual rather than institution based data on faculty in alternate years should be evaluated.

A new longitudinal cohort should be studied to examine the impact of economic changes and alternative forms of education on the postsecondary population.

The benefits of combining selected data from the National Assessment and the National Longitudinal Study should continue to be assessed.

Information on the current and future demand for teaching personnel should be incorporated in the Common Core program.

The users and uses of library statistics should be studied as a basis for determining the appro-

priate level of effort and types of data to be collected by NCES.

Adequate resources should be devoted to the design of population-based studies and to the analysis of the resulting data.

The need for annual, universe data on scientists and engineers should be reviewed. The information requirement should be updated to reflect the growth of part-time enrollments.

The requirements of Federal program applications and administrative reports should be reviewed and analyzed to determine the core elements required of applicants and beneficiaries. A consolidated data base for Federal program information should be developed.

Consideration should be given to shifting a portion of the Federal evaluation effort from national survey activities to experimentally designed assessments of specific program interventions.

Improvement of Statistical Planning and Coordination.—The Advisory Council on Education Statistics should provide guidance concerning appropriate roles and priorities among alternatives for NCES.

An interagency focal point for the planning and coordination of Federal education statistics activities should be established to identify Federal education informational needs and priorities.

Activities of the Education Data Acquisition Council should be systematically coordinated with the proposed effort to establish education informational needs.

Education data collection systems sponsored by agencies outside the Education Division of DHEW should be carefully coordinated during the planning and design stages with appropriate units of the Education Division to ensure that compatible and nonredundant products are developed.

The Education Data Acquisition Council should serve as a clearinghouse to review all federally sponsored data collection activities which are directed primarily to education respondents.

Adequate resources should be devoted to assessing the status of education statistics, determining priorities, and establishing interagency agreements and mechanisms for data collection.

Development of New Systems to Fill Gaps.—A greater proportion of available resources should be devoted to determining the impact and effectiveness of specific educational program interventions. NIE, and the Office of Planning, Budgeting, and Evaluation within OE, should provide leadership in these activities.

Educational outcomes data should be strengthened.

Population data should be collected to ascertain the needs of out-of-school youth and adults.

A study of the sources and amounts of funds available for the funding of elementary-secondary and postsecondary education in relation to patterns of educational expenditures should be conducted.

Base line data should be collected on the contributions of private industry to postsecondary education and training. Development of an adequate classification of the types of education and training supported or operated by private industry must precede the collection of data.

Measurements of the relationship between the outputs of the educational system and the needs of industry for trained personnel should be developed.

Needed statistical resources should be shifted from data collection to standards implementation, data analysis and information dissemination.

INCOME, WEALTH, AND CONSUMPTION

Introduction and Overview

The need for statistics on the aggregates and size distribution of household income, wealth, and consumption is to depict over time the variations of income and living conditions among the Nation's population, and to provide the basis for analyzing the factors contributing to these differences. This information is basic to much of the discussion of public policy issues related to welfare, tax reform, aggregate economic demand, and, indirectly, business capital information. Involved in each of these issues are considerations of shares of income (flow of claims on resources), consumption (execution of claims on resources), and wealth (stock of

resources or of claims on resources) for persons, families, households, and economic institutions and of how these shares relate to performance and need.

The main focus of this chapter at present is on size distribution and aggregate statistics of income, wealth, and consumption in the household sector. The longrun intent is to broaden the chapter to include treatment to at least aggregate statistics of income, wealth, and consumption for other sectors. This larger task is beyond the resources that can be brought to bear in the shortrun.

In predicting that there would be over the next few years a major public policy debate on income shares and the distributional effects of public actions, Alice Rivlin [1] listed four sets of questions that the public and politicians might reasonably ask of economists:

"1. What is happening?

How great is income inequality and which way is it moving?
What are the effects of current government programs?

"2. What would be better?

Presumably no one wants economists telling them what the distribution of income ought to be, but they might reasonably expect them to be helpful in defining alternative forms and discussing how varying degrees of equality might be expected to affect other objectives.

"3. Why are things as they are?

Economists worth their pay ought to provide a workable theory that explains why the distribution of income has the shape it has and why it is changing or not changing.

"4. What can we do about it?

Useful economists ought to spell out some policy options and estimate their effects, not only on the distribution of income but on the size of the pot to be distributed."

The fundamental importance of income, wealth, and consumption statistics to describe conditions, compare alternatives, test theoretical hypotheses, and estimate impacts of existing and potential programs is self-evident and a justification of their need in the broadest sense. (The reader should also see related materials in Section III—Introduction, The Relationship of the National Accounts and the U.S. Statistical System; and Chapters III-A., Labor Statistics; III-B., Price Statistics; III-E., National Economic and Business Financial Accounts; and III-L., Income Maintenance and Welfare Statistics.)

Income, wealth, and consumption data are regularly used in the Congress by the Joint Economic Committee, the House Committee on Ways and Means, the Senate Finance Committee, various other standing and special committees, and the budget committees of both Houses in the consideration of economic, tax, income maintenance, and budget issues. In the executive branch, the Council of Economic Advisors, the Department of the Treasury, the Federal Reserve Board, the Office of Management and Budget, the Department of Health, Education, and Welfare, the Department of Labor, and other agencies use these data in consideration of economic policy, social well-being, taxation and revenue measures, and budgets. The Federal Reserve Board uses these data in formulating monetary policies. Outside the Federal Government, these data are used by business firms, labor unions, trade associations, research organizations, universities, State and local governments, and regional public agencies.

This information currently is compiled from three broad approaches: (1) direct survey data (e.g. the Census Bureau's household current population survey); (2) administrative records (e.g. Internal Revenue Service's tabulations of individual tax returns in *Statistics of Income);* and (3) synthesis of all available information into a comprehensive national economic accounting framework (e.g. Bureau of Economic Analysis' measures of personal income and its size distribution. The availability of the data on the components of income, expenditures and wealth varies markedly in terms of frequency, distributional detail, and comprehensiveness. Wealth data typically are compiled only for the aggregate (i.e., very limited data on size distributions) of all households; these are available annually for housing and consumer durables stocks, bank deposit ownership and only sporadically for portfolio investments and liquid assests. Income data are available monthly as an aggregate total for all households and annually for size distributions among households. Expenditure data are

[1] Alice M. Rivlin, "Income Distribution—Can Economists Help?" *American Economic Review,* Vol. LXV, Number 2 (May 1975).

provided quarterly for the aggregate of all households, but up until now only about once every ten years for size distributions.

Responsible Agencies and Core Programs

The Bureau of the Census collects and compiles comprehensive data on money income and its distribution among persons, households, and families in the decennial census of population and the March current population survey. The income data are for a calendar year and are associated with the pertinent social and demographic characteristics of the income-receiving units (education, labor force status, age, etc.).

Annual and periodical statistical reports based on tax returns are prepared by the Internal Revenue Service (IRS). Reports in the *Statistics of Income* (SOI) series cover returns from corporations and other businesses, individuals, estates, private foundations, and other sources. Data from individual tax returns show size distribution of adjusted gross income by tax return cross-classified by types of returns, deductions, and exemptions. Periodical statistics from estate tax returns, which are used in studies of individual wealth, include total estate by type of property, lifetime transfers, and deductions by size of estate and tax status.

The Bureau of Economic Analysis (BEA) in the Department of Commerce provides nationwide estimates of monthly personal income by industry; quarterly estimates of personal income by State and industry; quarterly estimates of disposable and per capita disposable personal income in current and constant dollars; personal consumption expenditures and personal saving; annual estimates of the size distribution of personal income; annual estimates of personal income by county and metropolitan area; and annual wealth estimates of the stocks of housing and consumer durables in historical-cost, constant-cost, and current-cost valuations. These measures are prepared as part of the BEA work on the national economic accounts (see Chapter III-E, National Economic and Business Financial Accounts). They are based on a synthesis of primary economic data mainly provided by the Census Bureau, Bureau of Labor Statistics, IRS, and Department of Health, Education, and Welfare. The synthesis reflects a comprehensive crosschecking and reconciliation of the data provided from the various sources as well as statistical adjustments to be consistent with the conceptual framework of the economic accounts. For example, the cross-checking process quantifies the tendency of understatement in the income data reported in Census household surveys as compared with income reported on IRS tax records; and conceptual adjustments include the addition of imputed income for the rental value of owner-occupied housing and food furnished to employees.

The Department of Health, Education, and Welfare (DHEW) provides information on income transfer payments to individuals. The Social Security Administration (SSA) compiles data on beneficiaries and benefits by type which are published monthly and quarterly in the *Social Security Bulletin*. An annual supplement presents more detailed data on benefits awarded by the demographic characteristics of the beneficiary. Also, the annual continuous work history sample based on social insurance tax records constitutes a longitudinal data base for the study of earnings. (Although this information is based on SSA records, the data actually are edited and maintained on computer tapes by BEA for providing statistical tabulations; prior to the release of these files to BEA, the social security numbers are scrambled to prevent identification of individuals.) In addition, the Office of the Assistant Secretary for Planning and Evaluation (APSE) in DHEW is developing a prospective new income survey of households, to be operational by the end of the decade. When this survey is implemented, it will include data for the whole population on quarterly as well as annual income from all sources and annually for assets. It will also oversample low income populations because of the prominence of these groups in DHEW programs. Data from administrative records will be used to upgrade estimates of types of income generally poorly reported in household surveys. Considerable effort will be made to measure income in kind as well as in cash. ASPE also sponsors the income dynamics panel, a longitudinal survey whose main purpose is to study the factors that affect the changes in the economic well-being of families over time.

Estimates of personal income from farm sources on a monthly basis nationally and quarterly by State are prepared jointly by the Economic Research Service (ERS), Department of Agriculture (USDA) and by BEA. The ERS provides annual estimates of personal income of the

farm population both from farm and nonfarm sources. ERS also prepares annual wealth estimates of the value of farm dwellings and of household equipment and furnishings on farms. The Statistical Reporting Service conducts surveys of farm production expenditures and farm family living expenditures. The Agricultural Research Service publishes data on the economic aspects of family living including estimates of household food consumption, the cost of food at home, the cost of clothing for individuals, and the cost of raising a child, as well as the income, expenditures, and consumption of rural families.

The most detailed recent data on consumer expenditures were collected by the Bureau of the Census for the Bureau of Labor Statistics (BLS) in the 1972–73 Consumer Expenditures Survey (CES). The previous CES was conducted for 1960–61. Data were collected on expenditures with related information on income and savings. The results of the survey, with varying amounts of expenditure detail, classified by socioeconomic characteristics of families, will be summarized for the Nation, geographic regions, and selected urban areas. BLS is developing a continuing consumer expenditures survey, for which full funding was provided in the 1978 budget. This survey will provide a rotating system for collecting up-to-date information on consumption and income data, classified by socioeconomic characteristics of the population, for use in analyzing changing patterns of consumption. This will be a major improvement over the previous periodic surveys conducted approximately every 10 years. BLS also compiles a variety of regular data series on wages, real spendable earnings, and standard family budgets. (Also see Section III, Chapter A., Labor Statistics, and Chapter B., Price Statistics.)

The Board of Governors of the Federal Reserve System compiles quarterly estimates of the amount of mortgage debt outstanding, by holder and property type. For short- and intermediate-term consumer installment credit, the Board compiles monthly estimates of the amount of credit extended, liquidated, and outstanding, and the net change in outstanding, by holder and credit type, based partly on data collected by the Board from commercial banks and finance companies. In addition, the Board gathers and publishes statistics on finance rates for selected types of consumer loans offered by commercial banks (monthly) and finance companies (monthly or quarterly). The Board also has been compiling a series on household net worth, on a preliminary basis, and although these figures have not yet been published, the Board expects to put out a more refined version of a household balance sheet in the near future along with comparable balance sheets for all other sectors.

Four advisory groups impact directly on income, wealth, and consumption statistics. The Office of Management and Budget's (OMB) Interagency Committee on Poverty and Income has an important role in coordinating practices and setting standards for all affected agencies. The OMB Advisory Committee on Gross National Product (GNP) Data Improvement recently completed a comprehensive evaluative study of data improvements needed for the preparation of the national income and product accounts. Several recommendations were made in the Committee's report that also would strengthen the measures of income and expenditures discussed in this chapter (see Section III-Introduction, The Relationship of the National Accounts and the U.S. Statistical System). Two Census Bureau public advisory committees, the Census Advisory Committee of the American Economic Association and the Census Advisory Committee on Population Statistics, provide valuable guidance on content and methodology of income statistics programs in that agency.

Program Problems and Recommended Changes

The Effect of Taxes and Income In Kind.—Income has meaning for human well-being because it represents claims over resources, that is, it is the means by which persons, families, or households purchase food, shelter, services, and so on, needed for existence and to accommodate notions of equity and aspirations for improved living conditions. That is why society is concerned about, and endeavors to measure, the distribution of income. It is axiomatic that the measures of both total income and its distribution are materially affected by the choice of what is counted as income.

The Census Bureau's current population survey (CPS) in its yearly March survey of income received in the previous year is the most current source of annual information of the distribution

of income for individuals, families, and households. As noted previously, it includes almost all forms of cash income before taxes; however, it excludes almost all forms of income in kind, and does not provide measures of income after taxes. Additions of noncash income have, of course, become increasingly important over the last decade as a result of new and expanded Federal social programs. For example, the Federal subsidy for food stamps grew by almost 700% from $0.5 billion in 1970 to $4.3 billion in 1975, [2] and medicare expenditures grew by 179% from $6.7 billion in 1970 to an estimated $18.7 billion in 1977. [3] At the same time, tax payments impact significantly in lowering consumer purchasing power. For example, Federal personal income taxes and contributions for social insurance alone now account for about 15% of the gross national product (GNP). [4] These considerations of excluded incomes and taxes in the CPS vary importantly by income size, as well as involving large money sums in the aggregate.

Income in kind is a device much used as employee compensation in the private sector, too (e.g., housing, health care, use of company cars, employee discounts on merchandise, and subsidized eating facilities). There are also various exemptions in the tax laws, which lower the payment of personal income taxes. These factors have still further differential effects on income distribution.

Thus transfers of income in kind and deductions for income taxes affect claims on resources in the aggregate; moreover, transfers of income in kind vary considerably in the degree of discretion with which the individual or family can exercise the claim. The conceptual exclusion from measurement of these factors of income seriously hampers the usefulness of the CPS data for the description of income distribution and the analysis of the distributional effects of actual and potential public action. As an alternative to the CPS, the previously noted BEA measures of the size distribution of personal income—food stamps, medicare, medicaid, rental value of owner-occupied housing, food and lodging furnished employees, food and fuel produced and consumed on farms, and imputation for selected categories of interest and the value of life insurance policies. These estimates are based on administrative records of Government programs, available survey data and other relevant information. They also represent a matching of IRS tax return and CPS household data as a method of crosschecking similar information reported in two sources and for deriving estimating factors in allocating different sources of income by income size and demographic (age, sex, race, etc.) groups.

RECOMMENDATIONS:

1. Despite difficult problems in measurement and valuation of certain types of income in kind such income should be included within the scope of the Census Bureau's CPS measures of household income, and the CPS estimate of income of all types (reported and allocated) should be compared to appropriate, independently derived aggregates just as the money income estimates have been in recent years.
2. The Census Bureau's CPS data on household incomes should be expanded to include income after the payment of income and social insurance taxes, and these data should be tabulated by income size.
3. The BEA measures of personal income by size class should be expanded initially to include income after the payment of personal income and social insurance taxes; subsequently they should be broadened further to include disposable personal income, consumer expenditures, and personal saving. The second stage of disposable income and saving requires additional measures of personal tax and nontax payments by income size class.

Valuation of Income In Kind.—Given the fairly resonable proposition that income in kind is just as real as cash income, one faces the very practical problems of what to value, how to value it, and how to allocate it by income size group. As noted above, the BEA measures are based on administrative records and other data as well as extensive estimating procedures for filling gaps in directly reported data. In evaluating the adequacy of the existing measures of income dis-

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[2] Table 767, Food Stamp Program, *Agricultural Statistics 1975* (Washington, D.C., U.S. Government Printing Office, 1975).

[3] "Special Analysis A," *Special Analyses: Budget of the United States Government, Fiscal Year 1977* (Washington, D.C.: U.S. Government Printing Office, January 1977).

[4] *Ibid.*

tribution, this raises the ever-present questions of how good and comprehensive the indirect estimating procedures are, and which items should be considered for directly reported data in terms of the quality of reporting, costs of collection, and burden of respondents.

RECOMMENDATION:

4. An interagency task force should focus sharply on identifying practical methodologies for measuring income in kind by income size class. The study should evaluate the alternative methodologies of collecting direct survey data and using indirect estimating procedures for selected components of income in kind. The task force should be composed of Census Bureau, BEA, and DHEW personnel and chaired by the OMB Statistical Policy Division.

Coverage Improvement.—Comparison with independently derived BEA estimates of aggregate personal income shows significant undercoverage for the comparable types of income included in the scope of the Census Bureau's CPS definitions of money income. This undercoverage mainly reflects reporting problems in the respondent households; problems of sampling variability are minor.

Overall, income reported in the CPS amounted to 76.0% of the aggregate income estimated from independent sources in 1974.[5] By means of allocation and imputation of missing income reports based on other characteristics of the nonrespondent, an additional 13.2% of the independent aggregate was estimated so that the total proportion accounted for one way or another in the CPS was 89.2%. For specific types of income, coverage ranged from 99.1% (72.7% reported) for nonfarm self-employment income and 97.1% (83.8% reported) for wage and salary income to 44.2% (35.7% reported) for dividends, interest, net rentals, estates, trusts, and net royalties.

The BEA personal income figures are based mainly on IRS tabulations of income tax returns. The data from these administrative records are used for the aggregate and size distribution measures of personal income. The personal income measures also incorporate revisions to the initial tax return data resulting from audited returns in the IRS taxpayer compliance measurement program.

The crucial value of the CPS income figures is their association with the rich body of demographic and social data about the respondents. The demographic and social data are not available in the IRS tax data. Generally, for the population and types of income covered, the tax data on reported incomes are considered to be more reliable than the CPS income data. Thus, a major aspect of the BEA series on personal income size distributions is its merging and reconciliation of the CPS and IRS series.

RECOMMENDATIONS:

5. The Census Bureau should undertake expanded systematic methodological research on problems and remedial measures associated with reporting errors in the CPS household income data.
6. In addition to the problem areas specified in this section, implementation of the recommendations of the Advisory Committee on GNP Data Improvement, that were addressed to problems of measuring income and expenditures discussed in this chapter, should be included in programs to strengthen Federal statistics in these areas. Such improvements refer primarily to BLS, IRS and DHEW data on wage and self-employment income, and Census Bureau data on expenditures (retail sales).

Personal Assets and Debt Data.—Consideration of the equity and utility of income distribution cannot intelligently take place outside of the context of wealth (stock of resources or of claims on resources). A given current flow of income has a very different meaning for say, a mature family group which owns a home, auto, etc., and a nascent family group which owns little more than a change of linen and owes the hospital bill for a new baby. The annual BEA wealth measures of the stocks of housing and consumer durables and similar estimates by ERS of such assets for farm households refer to the aggregate of household units without regard to income size class. The Federal Reserve Board measures of household financial assets and liabilities and the new series on household net worth, now being compiled on a preliminary basis though not yet

[5] Table A-8, *Current Population Reports*, Series P-60, No. 97 (Washington, D.C.: U.S. Government Printing Office, 1975).

published, refer only to aggregates for the household sector without regard to income size class. The housing stock data in the decennial census of housing and the annual housing survey, available annually but not published, provide tabulations on the value of housing by income size class, but these refer only to single family housing on less than 10 acres and with no associated business or commercial activity. Mobile homes are also excluded from these Census Bureau data. The Federal Reserve Board measures of consumer debt and mortgages refer to the aggregate household sector only. Similarly, mortgage data of the Federal Home Loan Bank Board are in the aggregate only and are not available by income size class. Department of Housing and Urban Development's figures on mortgages are tabulated by income size classes, but they refer only to FHA-insured loans. The effect of personal assets and debt on the significance of income flow, and the current inability to relate comprehensive assets and liabilities data to income size classes and other characteristics of households, make it desirable to obtain expanded data on assets and debts in conjunction with other socioeconomic characteristics of individuals and households.

RECOMMENDATION:

7. The prospective BLS continuing consumer expenditures survey should be expanded to collect data on household assets and debts, and such data should be tabulated by income size class. (See also Chapter III-B, Price Statistics.)

Summary of Recommended Changes

1. Income in kind should be included within the scope of the Census Bureau's CPS measures of household income, and the CPS estimate of income of all types (reported and allocated) should be compared to appropriate, independently derived aggregates just as the money income estimates have been in recent years.
2. The Census Bureau's CPS data on household incomes should be expanded to include income after the payment of personal income and social insurance taxes, and these data should be tabulated by income size class.
3. The Bureau of Economic Analysis' measures of personal income by size class should be expanded initially to include income after the payment of personal income and social insurance taxes; subsequently they should be broadened further to include disposable personal income, consumer expenditures, and personal saving.
4. An interagency task force should focus sharply on identifying practical methodologies for measuring income in kind by income size class. The study should evaluate the alternative methodologies of collecting direct survey data and using indirect estimating procedures for selected components of income in kind.
5. The Census Bureau should undertake expanded, systematic methodological research on problems and remedial measures associated with reporting errors in the CPS household income data.
6. Implementation of the recommendations of the Advisory Committee on GNP Data Improvement that were addressed to problems of measuring income and expenditures discussed in this chapter should be included in programs to strengthen Federal statistics in these areas.
7. The Bureau of Labor Statistics continuing consumer expenditures survey should be expanded to collect data on household assets and debts, and such data should be tabulated by income size class.

SOCIAL INDICATORS AND SOCIAL ACCOUNTS
A Developmental Strategy

Introduction

The objective of this paper is to consider a strategy for social indicator development in terms of two closely related activities: (a) the preparation of social indicator reports, including periodical publications containing such indicators, and (2) the construction of a social accounting framework which would facilitate the derivation of improved indicators of social processes and changes.

Recent efforts to prepare social indicator reports and related publications are reviewed. Prospective efforts in the area of social indicator research and development, focusing on improvements in the data base and the incorporation of these data into some kind of social accounting framework, are also considered. The concluding part provides a summary of some issues and options which emerge from the preceding considerations.

Social indicators may be described as social statistics (direct counts or derived measures) which are considered to reflect some important aspect of social conditions and trends. They constitute a subset of the available body of demographic, economic, and social statistics which may be obtained from a variety of public and private sources. The criteria whereby social indicators may be selected depend upon the purposes they are intended to serve. In general terms, three broad types of indicators may be distinguished on this basis: descriptive indicators, analytical indicators, and programmatic indicators.[1]

Descriptive indicators are needed to depict, in statistical terms, the current condition of the society and emerging trends in its evolution. For this purpose, it is necessary to select statistics related to the well-being of different population groups—their health, housing, education, modes of livelihood, income, protection against economic and other hazards, access to goods and services, opportunity for advancement, and the like. The usefulness of such data is enhanced when they are available in time-series form, so that trends may be revealed.

Analytic indicators are intended to provide a deeper level of understanding than can be acquired by examining descriptive statistics alone. Analysis aims to explain why or how (in terms of related variables) a given condition has come about and thereby offers some clues as to what might be done to alter, improve, or adjust to that condition. The analytic process calls for the identification and measurement of those independent variables which significantly influence the condition or variable of interest. The distinction between descriptive and analytic indicators is a matter of degree. When descriptive indicators are presented either in time-series form or disaggregated according to certain relevant characteristics, they yield useful insights in their own right by revealing differences which would otherwise be obscured. Furthermore, statistical analysis can reveal the interrelations among selected variables and thereby suggest possible causal influences, but these can seldom be demonstrated with finality.

Programmatic indicators, finally, are statistical observations and measurements which are designed to aid in monitoring and evaluating specific policies and related programs. Such indicators frequently reflect program costs and impacts so that program effectiveness can be assessed. In short, when a particular set of statistics or statistical measure is selected as a social indicator, the underlying rationale may be that the data are thought to depict an important trend or characteristic, or that they provide some explanatory insight as to why some development of interest has occurred or failed to occur, or that they reflect the effectiveness of a particular policy or program.

The remainder of this paper is concerned with the development of a strategy for improving each of these types of indicators. At the out-

[1] Compare Eleanor Bernert Sheldon, "Social Reporting for the 1970's," in the President's Commission on Federal Statistics, *Federal Statistics*, Vol. II, Chapter 7 (Washington, D.C.: U.S. Government Printing Office, 1971). Also pertinent with respect to the general nature, purposes, and limitations of social indicators are articles by Eleanor Bernert Sheldon and Howard E. Freeman, "Notes on Social Indicators: Promises and Potential," *Policy Sciences*, I (Spring, 1970) and by Eleanor Bernert Sheldon and Robert Parke, "Social Indicators," *Science*, 188 (May 16, 1975).

set, it is necessary to differentiate two basic areas of social indicator development: the preparation of social indicator reports and the conduct of social indicator research and development. These areas are the subject of the following two sections.

Social Indicator Reports

The presentation of descriptive statistics in order to inform different users of current conditions and trends is of course the basic reason why such data are collected in the first place. The most comprehensive single example is the *Statistical Abstract of the United States,* whose centennial edition will appear in 1979. These publications, together with similar compendia dealing with particular subject areas, usually consist of printed tabulations without interpretive text. Their basic use is as reference documents for a variety of users.

More recently, efforts have been made to develop comprehensive reports which approach the idea of social indicator reports by including assessments of current conditions and trends and recommendations for needed policies and actions. By far the most comprehensive of these efforts was a four-year research project commissioned in 1929 by President Hoover and carried out under the direction of William F. Ogburn. This project culminated in the publication of *Recent Social Trends in the United States* (1933).[2] The separate volumes of this report provided detailed examinations of some thirty areas of American life and were a useful source of factual information in guiding the development of policies and programs during the depression years.

Nothing approaching this magnitude has been undertaken since then, but a number of more modest reporting efforts reflect intermittent concern with the potential usefulness of social reports which seek to cover a wide range of topics. Beginning in 1961, for example, the Department of Health, Education, and Welfare issued a monthly report entitled *Indicators,* supplemented by an annual compilation of selected time series entitled, *Trends.* Both reports presented selected statistics relating to program developments in the areas of health, education, and welfare together with selected descriptive statistics reflecting the condition of the population in these broad areas of concern. Brief articles treating selected topics were also included.

The resurgence of interest in societal assessment which accompanied the "great society" programs of the mid-1960's gave rise to the establishment, in 1966, of an advisory group of social scientists to advise the Secretary of DHEW on the measurement of social change and the preparation of a social report. The only published result of this large-scale effort was the appearance, in 1969, of DHEW's *Toward a Social Report.*[3] Despite its brevity (101 pages), this report is an important prototype in providing assessments of current status in seven major areas of concern—health and illness; social mobility; the physical environment; income and poverty; public order and safety; learning, science, and art; and participation and alienation.

An important supplementary undertaking was begun in July 1969, when President Nixon established a National Goals Research Staff within the White House, under the direction of Leonard Garment. The work of this group was terminated with the issuance of a report in July, 1970, entitled *Toward Balanced Growth: Quantity with Quality.*[4] Taken together, these two reports illustrate both the potential and the limitations of social reports. *Toward a Social Report* was intended to serve as a prototype for annual assessments of "social well-being" as a basis for making "informed decisions about priorities and directions in this Nation's social programs." The analysis it contained was deliberately normative and the criteria employed in selecting the few social indicators it contained emphasized that these indicators should have normative significance. *Toward Balanced Growth* had a different focus. It was designed to explore possible alternatives for future development by proposing a number of "debates of emerging is-

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[2] President's Research Committee on Social Trends, *Recent Social Trends in the United States* (New York: McGraw-Hill, 1933).

[3] U.S. Department of Health, Education, and Welfare, *Toward a Social Report* (Washington, D.C.: U.S. Government Printing Office, 1969). The original intention of this effort was to inaugurate an annual social report. See the covering letter from Secretary Wilbur J. Cohen to the President, dated January 11, 1969.

[4] National Goals Research Staff, *Toward Balanced Growth: Quantity with Quality* (Washington, D.C.: U.S. Government Printing Office, 1970). President Nixon's announcement of the establishment of this research staff on July 13, 1969 also made reference to the preparation of "a public report, to be delivered by July 4 of next year, and annually thereafter. . . ."

sues" for public consideration. Thus both reports shared a normative orientation and both of them made use of selected descriptive statistics in their analysis and interpretation.

The limitations of both reports were well known and expressed by their authors. In preparing *Toward a Social Report,* it soon became evident that the bulk of the statistics available for any given subject were designed for administrative management purposes, not for societal assessment. Data relating to the well-being of individuals or population groups or to the results or outcomes of particular policies or actions were, and remain, extremely hard to come by. Those who prepared *Toward Balanced Growth* encountered an equally serious obstacle: the paucity of normative projections tracing alternative paths toward the attainment of specified goals. Although the staff carefully avoided prescribing goals, it could not escape the need to offer alternative goals for public consideration, in the form of issues raised in its emerging debates.

Shortly after the publication of *Toward a Social Report,* work was begun within the Office of Management and Budget on the first comprehensive national social indicators report, *Social Indicators 1973.* This renewed effort was motivated largely by the belief that the careful process of data selection which characterized *Toward a Social Report* could readily be extended to provide more adequate coverage of the major areas of concern. Whereas the preceding reports consisted primarily of interpretive essays, the social indicator report was designed to provide a statistical portrait of the society, stressing the graphical presentation of descriptive statistics without analytic or interpretive text. This focus was justified, in part, by the notion that statistics, if properly selected and presented, speak for themselves. It was further justified by the fact that the primary audience for which the report was designed consisted of individuals in policymaking or policy-influencing positions within the Federal Government—persons who would be relatively experienced in gleaning useful intelligence from raw statistics and who would be expected to develop their own interpretations in any case. This approach was patterned after the long-standing practice of presenting economic indicators without interpretive text.

Social Indicators 1973 was issued in February, 1974, after more than four years of development. The reception accorded this first publication offers few clear-cut lessons as yet, but a number of tentative conclusions can be offered. About 5,000 copies were distributed among the legislative and executive branches of the Federal Government and selected governmental agencies at the State and local level. Another 14,000 copies were purchased by libraries and private individuals. From the limited feedback, it is possible to distinguish four broad audiences for reports of this kind: governmental policymakers and their staffs, librarians and other reference sources, private researchers and research organizations, and interested members of the general public.

Interviews with a small sample of high-level government officials, conducted by Nathan Caplan and associates of the University of Michigan, indicated that while *Social Indicators 1973* was well received, it was generally regarded to have promised far more than it could deliver.[5] It was felt that the bulk of the data presented did not satisfy the criteria initially set forth for social indicators—that the measures selected should reflect the well-being of individuals or families and that they should relate to outcomes or results rather than inputs of resources. Furthermore, the high level of aggregation required to cover a range of subjects in a single publication meant that the information supplied was seldom directly relevant to any particular set of policy deliberations. Finally, descriptive statistics, whether they relate to inputs or outputs, cannot inform the policymaker as to whether a particular program has brought about its intended outcome or whether its benefits outweigh its costs. Thus the report was generally regarded as an exceptionally attractive reference document, to be used as a handy

[5] Nathan Caplan and Eugenia Barton, *Social Indicators 1973: A Study of the Relationship between the Power of Information and Utilization by Federal Executives,* published by the Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, the University of Michigan, September 1976. For insight into the informational needs of policymakers with respect to social issues, see *Social Research and Development of Limited Use to National Policymakers,* a report of the Comptroller General of the United States to the Congress, April 4, 1977. Also useful is Martin Rein, *Social Science and Public Policy* (Harmondsworth, Middlesex, England: Penguin Books, Ltd., 1976).

source of background information in speech writing, a service which many other reference works, such as the *Statistical Abstract* can also provide.

The response of academic researchers and other specialists is also fairly well documented, thanks to the publication of a review symposium organized by the Social Science Research Council shortly after the appearance of *Social Indicators 1973*.[6] Besides the numerous technical criticisms that were offered by these reviewers, the major general criticism was the absence of analysis and interpretive text. Most of these specialists recognized that the report was not primarily intended to meet their own more stringent data requirements, but they were nevertheless concerned with both the data selection process (what was included, what was left out, and why) and with the paucity of analysis, particularly in regard to the quality of the data, possible misinterpretations, and the like. Whereas both the policymakers and the technical specialists were commonly critical of the absence of interpretive essays, the latter group tended to be especially concerned with the absence of adequate warnings as to the limitations of the data presented.

Much less information is available as to the reactions of individual private purchasers of the report, but it is apparent that many of these purchasers have found the report to be extremely useful in providing a quick summary of information in each of the major areas covered. The graphic presentations in particular have won almost universal praise.

Work was begun on the preparation of a second social indicator report, *Social Indicators 1976* in July, 1974. The general format of this report is similar to that of its predecessor. It again features the graphic presentation, in color, of summary descriptive data on the socioeconomic characteristics of the population, with very limited geographic detail but with considerable disaggregation by age, sex, color, and other background variables. The coverage of the second report has been enlarged considerably, from eight to eleven social indicator chapters plus an introduction to the report as a whole. In addition, each chapter contains a section of opinion data relating to public perceptions and a section providing a few international comparisons. Summary statistics relating to the socioeconomic characteristics of a number of ethnic groups, drawn of necessity from the past three decennial censuses, are also included in the introductory chapter, together with a brief discussion of the nature of sampling error and sources of nonsampling error which may affect the quality of the data presented.

The report does not provide interpretive text or detailed analysis of the data shown; however, a special issue of *The Annals* (of the American Academy of Political and Social Science) will be issued in January 1978, after the publication of *Social Indicators 1976*. This issue will contain a number of interpretive essays based on the chapters of the report. This publication will also contain selected statistical material presented in *Social Indicators 1976* and will therefore provide a variety of interpretations which could not be included in the report itself.[7]

In the Spring of 1976, work was also begun at the Bureau of the Census on the preparation of a monthly chartbook, *STATUS*. Four issues of *STATUS* were issued to a number of individuals both within and outside of the Federal Government, starting with a July 1976 issue and ending with an October issue. *STATUS* was originally an outgrowth of the weekly briefing notes which were prepared for the White House beginning in the fall of 1974. These weekly reports contain selected current statistics, in graphic form, relating to a wide variety of domestic conditions and developments. *STATUS* was designed as a public version of these notes.

STATUS may therefore be regarded as an alternative mode for the presentation of social indicators to a wider audience. Although no single issue of *STATUS* could possibly offer the comprehensive coverage of different subjects that is provided in a social indicator report, its cumulative content, over a twelve-month cycle of publication, could include considerably more detailed information and could, in addition, retain greater flexibility in providing coverage of special topics or particular population groups which would cut across several subject areas. It

[6] Roxann A. Van Dusen (ed.), *Social Indicators 1973: A Review Symposium* (Washington, D.C.: Social Science Research Council, Center for Coordination of Research on Social Indicators, 1974).

[7] The special editor for this issue of *The Annals* is Conrad Taeuber of Georgetown University.

would also permit publication of data from recently released topical reports on a timely basis.

In summary, *Social Indicators 1976,* designed as a biennial publication, and *STATUS,* originally intended to be a monthly chartbook, are both representative of the current state of the art with respect to the graphic presentation of descriptive statistics. Neither publication has enjoyed the resources or the lead time to permit extensive analysis or retabulation of available data, but both of them are appropriate vehicles for the presentation of comprehensive statistical data relating to a variety of subjects and designed to meet the interests of nonspecialists.

Periodical publications, such as *STATUS,* enjoy two major advantages over annual or biennial reports of a more comprehensive nature. First, they can provide much more current data and second, they can provide a quick and flexible means for presenting materials of current interest on an ad hoc basis. For example, a periodical report can capitalize on the availability of occasional studies relating to special population groups or to other subjects which cut across a number of areas of social concern. Their disadvantages include their inability to provide comprehensive treatment of several subjects in any single issue, their limitations with respect to the depth of treatment that can be given to any topic, and their limited ability to operate with a formal organizational framework.

These two types of social indicator reports—the monthly chartbook and the annual or biennial social indicator report—are not the only vehicles for communicating selected statistical data to the general public. Several major statistical agencies have begun publication of comprehensive annual reports covering the subject matter under their jurisdiction in a format similar to that of the OMB report. Two examples may be mentioned here: the National Center for Education Statistics (DHEW) produces an annual report entitled *The Condition of Education* and the National Center for Health Statistics (DHEW) has issued its first comprehensive report, entitled *Health, United States, 1975.*[8] Because these types of reports focus on a particular subject area, they provide more detailed coverage than is possible in any report covering several areas.

All of the above reporting activities may be regarded as experimental efforts at public communication. They share a common reliance upon descriptive statistics selected from sample surveys and administrative records. They also share a common limitation with respect to the depth of analysis and interpretation that can be developed on the basis of such data. Continuation of these reporting efforts may be expected to yield improvements in the selection and organization of materials, in modes of presentation, and perhaps in responsiveness to emerging public issues and interests. Such efforts cannot be expected to generate deeper levels of understanding of the factors underlying the developments which are observed. Even less can they be expected to provide clear-cut evidence of the effectiveness of particular programs or policies.

In short, descriptive statistics provide useful factual information concerning current conditions and trends. These facts, in turn, provide essential guidelines in formulating improved questions for further research. A strategy for social indicator research and development, aimed at generating measures that would provide more adequate descriptions and greater analytic power, is discussed in the following section.

Social Indicator Research and Development

With respect to descriptive indicators, two main lines of research and development appear to hold promise. First, the improvement of the data base from which indicators are derived, both in terms of more comprehensive coverage of different areas of concern and in terms of greater comparability of concepts and classifications, would in time yield more adequate indicators of the status and conditions of different population groups in the society. Second, the ongoing efforts of the Social Indicator Development Program of the Organization for Economic Cooperation and Development (OECD) are aimed at producing a basic core of social indicators which would reflect conditions and trends with respect to each of the major areas of social concern which have been agreed upon by member countries.

The achievement of greater comparability of concepts and classifications is requisite to de-

[8] U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, *The Condition of Education,* 1976 edition and National Center for Health Statistics, *Health, United States, 1975* (Washington, D.C.: U.S. Government Printing Office).

veloping tabulations and analyses which utilize data from different sources or covering different subjects. Some of the major surveys whereby statistical information on different aspects of our social condition is collected include the Current Population Survey (CPS); the Annual Housing Survey (AHS); the Survey of Income and Education (SIE); the National Crime Victimization Survey (NCS); the Consumer Expenditure Survey (CES); the Health Interview Survey (HIS); the Health and Nutrition Examination Survey (HANES); and the National Assessment of Educational Progress (NAEP). Among these, the current population survey is unique in serving as a general-purpose data collection mechanism which is employed in obtaining a wide variety of information on the social, economic and demographic characteristics of the population. It is possible, at least in principle, to increase the analytic usefulness of the data collected in these several major surveys by achieving agreement on a common set of concepts, definitions, classifications and procedures to be employed in all of them. A number of considerations militate against such agreement, except perhaps for a very limited subset of variables. To begin with, the several areas of social concern do not share with systems of national economic accounts the property of being represented by transactions expressed in terms of common monetary values.

On the contrary, the variables of social interest necessarily relate to different units of observation. When these units are people, they may consist of individuals, households, families, work teams, or other formal or informal associations. When they are geographic locations, they may consist of housing complexes, neighborhoods, towns, cities, or larger administrative units or geographic areas. In still other cases, the units of observation may consist of events or transactions, such as traffic accidents, crimes, or births, deaths, and other vital events. This diversity does not imply that common concepts and classifications are unattainable, but it does suggest that any commonality that is achieved will be both complex and of limited coverage and applicability.[9]

A second limiting factor is the extreme variation in the amount of detailed information required to meet the purposes of different social surveys. Except for a few items of information collected from all persons in a decennial census, all survey data (and many administrative statistics as well) are collected on a sample basis. The size of the sample to be drawn in a particular survey depends on a number of factors, including the heterogeneity of the population to be surveyed, the frequency of observations called for, whether successive observations should be obtained independently, the level of disaggregation required to provide the required information, and, most critically, the level of reliability needed for information relating to the smallest groups or cell frequencies for which separate estimates are desired. At one extreme, a nationally representative sample of perhaps 1,500 persons may suffice to yield acceptably precise estimates of certain population characteristics for the country as a whole. At the other extreme, a 20% sample, comprising some 15 million households, may be required to provide acceptably precise estimates of unusual combinations of characteristics for small geographic areas or for special population groups. Here also, no single conceptual framework can hope to satisfy such diverse information needs without considerable sacrifice of efficiency or loss of information.

Finally, there remains the problem of the different concepts, classifications and procedures which may be employed in collecting information on the same subjects for different purposes. Some of these differences are clearly fortuitous and may readily be resolved by proper planning and coordination. But in many instances, these differences reflect alternative perspectives and research interests and are therefore less likely to prove amenable to common treatment. This final limitation applies as well to the emergence, over time, of unanticipated problems, new theories and perspectives, policy innovations,

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[9] For an appreciation of the technical difficulties to be overcome in establishing a workable data system of the kind envisioned, see Edgar S. Dunn, Jr., *Social Information Processing and Statistical Systems—Change and Reform* (New York: John Wiley & Sons, Inc., 1974). Also informative in this regard are articles by H.S. Winsborough, "Age, Period, Cohort, and Education Effects on Earnings by Race—and Experiment with a Sequence of Cross-Sectional Surveys," in Kenneth C. Land and Seymour Spilerman (eds), *Social Indicator Models* (New York: Russell Sage Foundation, 1975) pp. 201–217, and by Eivind Hoffmann, "Connections within the System of Social and Demographic Statistics: An Introductory Discussion of their Thematic and Methodological Basis," a discussion paper prepared for the Working Party on a System of Social and Demographic Statistics of the Conference of European Statisticians, the United Nations Statistical Commission and the Economic Commission for Europe (May 6, 1976).

and the like. No set of concepts and classifications can hope to anticipate future needs, insights, and approaches.

These considerations suggest the need for a short-term strategy, designed to make optimal use of available statistics in meeting the continuing need for comprehensive information on social conditions and trends, and for a long-term strategy, designed to improve the data base from which such information may be derived in the future.

In the short term, further efforts should be made to establish comparable concepts and definitions of basic background variables and common characteristics of the units of observation so that data linkages at intermediate levels of aggregation could be made. For example, several of the major surveys now conducted collect data relating to individual members of particular households. Some of these data can usefully be interpreted as a characteristic of the household in question. Common definitions of a household and of certain of these characteristics would permit comparisons of data from the CPS (now covering over 60,000 households each month), the consumer expenditure survey (20,000 families), the annual housing survey (60,000 housing units in the national sample), and the health interview survey (42,000 households or 140,000 persons). Data linkages at intermediate levels of aggregation are of course beset by familiar problems of aggregation bias. Comparisons of the characteristics of specified groups of households, utilizing data from different surveys, can nevertheless yield useful information beyond that available from any single source without encountering the problem of confidentiality and disclosure restrictions which limit data comparisons at the microlevel.[10]

A second focus of short-term development is the ongoing effort of the OECD Working Party on Social Indicators which seeks to identify and specify a number of agreed-upon statistical measures which can serve as indicators for each of the major areas of concern, such as health, learning, employment, the quality of working life, access to goods and services, etc. This activity offers three major services to the participating member countries. First, by pooling the experience of individual member countries, supplemented by background papers prepared by expert consultants, the OECD Working Party provides a summary of the state of the art with respect to indicator development in each area of concern. Second, as the Working Party proceeds through phase II of its work (by the end of 1978), it may be expected to provide detailed recommendations for fuller exploitation of available data sources and for reducing the data gaps that are found. Finally, this effort provides a forum for the informal exchange of ideas and experience among technical experts in a number of particular subject areas via the work of some fifteen Common Development Efforts which have been established to develop detailed recommendations of social indicators or proxy measures in a number of subconcerns.[11]

The improvements which can be expected from these short-term efforts are largely incremental. With rare exceptions, the indicators which can be selected or developed from available data sets are purely descriptive. When they are available in time-series form or disaggre-

[10] For further discussion of the usefulness and limitations of aggregate analysis, see Erik Allardt, "Aggregate Analysis: The Problem of Its Informative Value," and Hayward R. Alker, Jr., "A Typology of Ecological Fallacies," in Mattei Dogan and Stein Rokkan (eds.), *Social Ecology* (Cambridge, Mass.: The M.I.T. Press, 1969), pp. 41–51 and 69–86, respectively. For an elementary treatment of disaggregation in relation to social indicators, see Denis F. Johnston, *Disaggregations of Main Social Indicators* (Paris: O.E.C.D., publication forthcoming).

[11] Organization for Economic Cooperation and Development (O.E.C.D.), *List of Social Concerns Common to Most OECD Countries* (Paris: OECD, 1973). For a summary of the progress achieved to date in the development of social indicators by the OECD Social Indicators Development Program, see OECD, *Measuring Social Well-being: A Progress Report on the Development of Social Indicators* (Paris: OECD, 1976. The fifteen "Common Development Efforts" cover the following topics:

1. Healthfulness of Life
2. Measurement of Learning
3. Unemployment
4. Quality of Working Life
5. Time Use and Leisure
6. Distribution of Income and Wealth and Material Deprivation
7. Housing Conditions
8. Quality of the Natural Environment
9. Primary and Secondary Social Attachments
10. Victim Surveys
11. Inequality
12. Economic Accessibility
13. Methods of Data Collection for Social Indicators
14. Presentation of Social Indicators and Social Statistics
15. Applicability of Selected Concerns to Particular National Contexts

The United States is participating in CED's no. 1, 2, 3, 5, 10, 11, 12, and 13.

gated according to a variety of background variables, they can reveal important trends or differences. Furthermore, the juxtaposition of comparable information for particular population groups, drawn from different data sources, can provide a comprehensive account of the general condition or status of that group, as well as its well-being relative to that of other groups. The explanatory insight afforded by such descriptors is strictly limited; inferences concerning the reasons underlying observed trends or differences, when derived largely from analysis of descriptive statistics, can seldom provide definitive interpretations.

If the ultimate objective of social indicator development is to provide a deeper understanding of the determinants and consequences of existing social conditions and processes, it is necessary to consider, as a long-term strategy, policies designed to improve the data base on which improved explanatory constructs may be developed. One promising avenue for such development is the ongoing effort directed by the United Nations Statistical Office, the System of Social and Demographic Statistics.[12] Implementation of such a framework implies a fundamental transformation of the major data collection procedures whereby much of the Nation's social, economic, and demographic information is collected. For such surveys to be brought into the system that is envisaged, they would have to employ a common set of concepts and definitions relating to the units of observation, the classifications employed with respect to the variables of interest, and the disaggregations provided for analytic purposes. To the extent that such a framework is developed and utilized, it may be expected to yield rich dividends of information on both the characteristics (stocks) and the movements (flows) of particular population groups among the several major sectors of the society. Such measurements would of course constitute useful indicators in their own right.[13] More importantly, observations tracing the movement of individuals or population groups across subsystem boundaries could, with such a system, be linked with data from economic accounts so that economic and social transactions could be analyzed in comparative perspective.

The recent passage of legislation authorizing a mid-decade census in 1985 affords a unique opportunity to develop and introduce a set of common concepts (population characteristics, units of observation, principles of classification and disaggregation, etc.) whereby a basic core of information could be obtained for local areas. Subsequent employment of the same set of concepts among all of the major annual surveys would, in effect, create a series of "nested" surveys in which a common core of information would be collected from each population sample, together with a wide range of detailed information unique to each special-purpose survey. Such an approach would permit the creation of a linked data file beginning with the base line estimates obtained from the 1985 statistical effort and updated systematically with inputs from the following surveys. The resultant data system would permit more extensive analyses of observed relationships among a wider range of socioeconomic and demographic variables. As these data accumulate over time, synchronic analyses (based on data collected at one point in time) could be supplemented by diachronic or longitudinal studies, tracing observed changes over time.

It must be recognized that any improvement in descriptive adequacy or analytic power that can be achieved by means of comprehensive social surveys depends upon the richness of the data that are collected and the flexibility of the data processing capabilities that are developed. Common concepts, definitions, classification sys-

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[12] The most complete account of SSDS is the United Nations Statistical Office, *Towards a System of Social and Demographic Statistics* (ST/ESA/STAT/SER.F/18, New York: United Nations, 1975). For a treatment of the development of social indicators within an SSDS framework, see the United Nations Secretariat, *System of Social and Demographic Statistics (SSDS)—Draft Guidelines on Social Indicators* (ST/ESA/STAT.76/24 April 1975). For a brief summary of the usefulness of an SSDS, see United Nations Economic and Social Council, *System of Social and Demographic Statistics (SSDS)—Potential Uses and Usefulness.* A report of the Secretary-General (E/CN.3/449/19 June 1974). Also useful in this regard is D.W. Henderson, *Social Indicators: A Rationale and Research Framework* (Ottawa: Economic Council of Canada, 1974).

[13] For a general treatment of social indicator models, see Kenneth C. Land, "Social Indicator Models: An Overview," in Kenneth C. Land and Seymour Spilerman (eds.), *Social Indicator Models (op. cit.)*, pp. 5–36. For an ambitious example of such model building, see Karl A. Fox, *Social Indicators and Social Theory* (New York: John Wiley & Sons, Inc., 1974). For cogent criticisms of the "systems-analytic" approach to social reality, see Ida R. Hoos, *Systems Analysis in Public Policy—A Critique* (Berkeley: University of California Press, 1972) and David J. Berlinski, *On Systems Analysis* (Cambridge, Mass.: The M.I.T. Press, 1976).

tems, and principles of disaggregation, relating both to the fundamental units of observation and to the characteristics to be measured, are essential ingredients in developing a more flexible analytic capability. Such commonality can only be obtained by a process of compromise among a variety of research needs and interests. It is unrealistic to expect that any single survey instrument can satisfy all of the informational requirements relating to such diverse areas as health, education, housing, employment, crime, leisure, etc. It is realistic to consider the establishment of a comprehensive, multipurpose survey mechanism as a means for obtaining a basic set of comparable data in a cost-efficient manner, thus freeing additional resources for the special-purpose research efforts that cannot be accommodated by the general-purpose instruments.

Despite the rigidities that are entailed by any framework of common concepts and classifications, the analytic power of the resultant data system would be far greater than that of our present array of disparate data sources. Such a capability would, in turn, reduce the need for relatively costly single-time surveys. In addition, the need for a fixed framework of common concepts and definitions does not imply sacrificing the flexibility needed to respond to unanticipated research needs. On the contrary, given a basic sampling frame and survey apparatus, it is possible to induce supplementary survey items covering special topics at relatively small additional cost, as is routinely done with the current population survey. The problem arises when these special needs relate to some special population group or require special kinds of disaggregation of background data not provided by the existing framework.

There remains the question of programmatic indicators, which are measures designed to estimate the cost-effectiveness of particular programs. In view of the particular nature of most social programs and the fact that they are usually geared to meet the needs of particular population groups, it is unlikely that any comprehensive survey mechanism can hope to provide sufficiently reliable information to meet the needs of program assessment for individual programs. Unless such programs are developed with a built-in evaluation capability, any conclusions reached as to their effectiveness are unlikely to be definitive. Even if neither descriptive indicators nor analytic measures are likely to provide conclusive evidence as to the effectiveness of a particular program, they are nevertheless essential in guiding program planning and policy formation. These indicators can reveal salient differences among population groups and thus identify emerging problem areas or anticipated possible program needs in the future.

In addition, when descriptive indicators are available in time-series form, they may display trends of sufficient stability to warrant projection (under stated assumptions). Such projections may offer useful clues as to the possible or probable future environments in which prospective policies and programs will be expected to take effect. Even the most surprise-free extrapolations of observed trends can at least inform the policymaker of the likely consequences of a continuation of past trends.[14]

The concluding section of this paper takes up a number of options in regard to the future preparation of social indicator reports and the development of a social indicator research capability within a social accounting framework.

Issue and Options

Four separate tasks can be identified with respect to the preparation of future social indicator reports and the development of a social accounting framework which would provide an improved data base for multipurpose analysis in the future: (1) the conceptual development and preparation of a periodical publication, such as *STATUS*; (2) the conceptual development and preparation of future annual or biennial social indicator reports; (3) the establishment of a research and development effort aimed at con-

[14] On the preparation, uses, and limitations of projections in social areas, see Daniel Bell, "Twelve Modes of Prediction—A Preliminary Sorting of Approaches in the Social Sciences," *Daedalus*, Summer 1964, pp. 845–880; Bertrand de Jouvenel, *The Art of Conjecture* (translated from the French by Nikita Lary) (New York: Basic Books, 1967); Denis F. Johnston, "Forecasting Methods in the Social Sciences," *Technological Forecasting and Social Change*, 2 (1970), reprinted in Albert Somit (ed.), *Political Science and the Study of the Future* (Hinsdale, 111.: The Dryden Press, 1974), pp. 68–88; Denis F. Johnston, "Social Forecasting Methods and Social Indicators," in Jib Fowles (ed.), *Handbook of Futures Research* (Westport, Conn.: Greenwood Press, publication forthcoming); and Michael Young, "Forecasting and the Social Sciences," in Michael Young (ed.), *Forecasting and the Social Sciences* (London: Heinemann Educational Books, Ltd., 1968), pp. 1–36.

structing a social accounting framework of an SSDS type; and (4) the implementation of such a framework by means of a comprehensive survey program which can be initiated in conjunction with the mid-decade statistical effort of 1985.[15]

The following discussion considers some of the issues posed by the above tasks and some options whereby they might be accomplished most effectively.

Preparation of a Periodical Publication.—As its subtitle indicates, *STATUS* was originally designed as a "Monthly Chartbook of Social and Economic Trends." If such a publication were to be funded in the future, the reestablishment of the appropriate staff at the Bureau of the Census would ensure the continued development of a quality product. Consideration should be given, however, to changing the frequency of publication from monthly to quarterly. This would provide much needed development time for the more careful selection of data and the preparation of appropriate text and would, in addition, correspond more closely with the frequency with which most noneconomic data are reported. A quarterly publication would also permit a considerable reduction in the cost of subscription, a factor which might bring such a report within reach of a much wider audience.

The bulk of the comments received with regard to the four issues of *STATUS* which were distributed in 1976 were highly supportive of this innovative effort. The criticisms were, for the most part, focused on technical weaknesses of a detailed nature which could readily be overcome with the accumulation of staff experience.

If such a publication is to be resumed, the principal issue to be dealt with is the maintenance of a strong editorial body which would ensure that the publication continues to adequately represent the diversity of subjects covered by the U.S. Federal Statistical System. This editorial committee should include representatives from all the major statistical agencies of government and its activities should be coordinated by the Statistical Policy Division of OMB.

Preparation of the Social Indicator Reports.—The first OMB report, *Social Indicators 1973,* was issued in February, 1974. The second report, *Social Indicators 1976,* is now scheduled for publication around September, 1977. Preparation of each of these reports absorbed 10 to 15 person-years of effort, exclusive of graphic and printing work which was contracted out. Unless additional staff and resources are provided for this publication, it is unlikely that future publications in this series can be prepared biennially without drastic reduction in its scope and coverage. Assuming that a decision is reached to continue this reporting effort, three options may be offered for consideration. First, the Bureau of the Census could be assigned responsibility for planning and preparing an annual or biennial social indicator report. An Interagency Committee would be established to direct the selection and organization of data for the social indicator report. Because the social indicator reports make extensive use of nongovernmental data, this option would also require the establishment of an Advisory Committee on Social Indicators to provide guidance and suggestions with respect to the inclusion of appropriate data from private sources. The Statistical Policy Division of OMB would coordinate the work of both committees.

The advantages of this option are obvious. Both the periodical and the biennial report display much the same format and include similar data. The cumulative coverage of the Chartbook (if it were to be published again) would provide a major source of data for the biennial report. The preparation of the latter report would afford the staff an opportunity to develop more comprehensive coverage of the major areas of concern while guaranteeing their awareness of the most recent available data. Its principal disadvantage stems from the natural tendency to impose a premature convergence on these two publications, reflecting a common set of managerial decisions. Furthermore, the impact of a publication purporting to represent the Federal Statistical System as a whole might be lessened if it were prepared and issued by any single statistical agency.

A second option is to retain the responsibility for preparing future social indicator reports

[15] For a broad perspective on the need to integrate social reporting, an improved analytic capability, and social policy formation, see Edgar S. Dunn, Jr. (*op. cit.,* footnote 9); Mancur Olson, Jr. "An Analytic Framework for Social Reporting and Policy Analysis," *The Annals of the American Academy of Political and Social Science,* Vol. 388 (March 1970), pp. 112–126; and Eleanor Bernert Sheldon and Kenneth C. Land, "Social Reporting for the 1970's," *Policy Sciences,* 3 (1972), pp. 137–151. The latter article is an extension of the one prepared for the President's Commission on Federal Statistics (see footnote 1).

within the Statistical Policy Division of OMB. Under this option, a separate Interagency Committee on Social Indicators, together with a renewed Advisory Committee on Social Indicators, would again function to guide and coordinate the selection of data to be included. The Publications Services Division of the Bureau of the Census would again be given responsibility for editing and preparing of the final manuscript for printing by the U.S. Government Printing Office, but the initial selection, organization, and preparation of the tables, charts, and text would continue to be carried out within the Statistical Policy Division of OMB.

The advantage of this option is that it is more likely to ensure that the social indicator reports should retain their unique character as products of the U.S. Federal Statistical System as a whole. Such a location for this effort may also facilitate obtaining the necessary cooperation from the many agencies supplying statistical data. In addition, the impact of a publication of this type, when issued by the Executive Office of the President, may be greater than when it is issued by any single agency of the Government. The principal disadvantage of this option is the need to provide staff support and funding within OMB.

A third option would be to locate the responsibility for the preparation of future social indicator reports elsewhere within the Executive Office of the President. For example, if a decision were reached to develop an annual "Social Report of the President" to accompany the annual Economic Report of the President, the appropriate locus of the social report staff might be as a separate unit within the Domestic Council, elsewhere within the Executive Office of the President, or as a part of a "Council of Social Advisors." This option would imply, first, that future social indicator reports would be developed on an annual basis, matching the frequency of the Economic Report of the President. Second, it would imply the inclusion of a greater amount of interpretive text, interpretation which would likely reflect current political orientations and administrative priorities. Nevertheless, adoption of this option would ensure higher visibility to the rich diversity of noneconomic information and would provide a powerful impetus to the improvement of the basic sources of these data. Furthermore, it would provide the general public with an awareness of the perceived significance of the data presented and inform them of governmental initiatives and goals in dealing with the problems and issues which emerge.

Research and Development for a System of Social Accounts.—As has been pointed out here and elsewhere, the Bureau of the Census has the principal responsibility for planning and executing all of the major household surveys and for preparing the tabulations of the data collected. A corresponding responsibility for the development and maintenance of our system of national economic accounts resides with the Bureau of Economic Analysis. Since both the Census Bureau and the Bureau of Economic Analysis are within the Department of Commerce, it seems logical that any major research and development effort aimed at constructing a social accounting framework within which these survey instruments could be coordinated should be carried out by the Department of Commerce. The fact that the Bureau of the Census will bear responsibility for planning and carrying out the mid-decade statistical effort also makes it imperative that some research and development staff be established at Census. The need to integrate these efforts with those relating to national economic accounts implies a need for a joint Census-BEA research and development team.[16]

In order to ensure that this planning activity benefits fully from the ongoing research efforts of private groups and international agencies, there is need to establish an Advisory Committee on Social Accounts whose members would include representatives from the principal private research efforts in this area and from the United Nations Statistical Office and other international agencies concerned with this line of development.[17]

[16] Similar proposals are made from time to time with respect to the need to improve and further integrate the information system for the national economy. A recent proposal of this type is Wassily Leontieff, "An Information System for Policy Decisions in a Modern Economy," a paper presented at the Columbia Law School Conference, Arlie House, Virginia, November 1976. For a wide-ranging discussion of the promises and problems of a system of economic and social accounts, see Milton Moss (ed.), *The Measurement of Economic and Social Performance* (New York: National Bureau of Economic Research, 1972).

[17] It is both difficult and important to establish improved channels of communication between academic researchers and governmental policymakers. Any government-based social indicator research and development work would need to collaborate with the principals involved in such major ongoing private researcher efforts as F. Thomas

The principal objectives of this research and development effort can be outlined in general terms. First, it would establish a detailed set of common concepts, definitions, classifications, and principles of disaggregation covering the units of observation and the variables of interest to be surveyed at mid-decade. Second, using the results of the mid-decade effort as a base line body of information, it would carry out a detailed examination of all of the major social survey instruments with a view toward extending the use of the common framework as widely as is feasible. The ultimate goal of these two phases of the operation would be to establish a comprehensive framework for the comparative analysis of data, at the lowest level of aggregation consistent with disclosure restrictions, from all of the major data collection efforts.

Given the wide scope of such a research effort, the Statistical Policy Division of OMB would be required to coordinate all phases of this work to obtain the necessary cooperation from the different agencies involved, in order to ensure that the special purpose surveys are integrated with the multipurpose surveys.

Implementation of a Social Accounting Framework.—If the efforts to develop a multipurpose social accounting framework are to be more than an academic exercise, it is essential that they be designed so as to take full advantage of the unique opportunity afforded by the mid-decade statistical effort. By the same token, it is essential that the mid-decade effort be conceived as an innovative undertaking, designed to provide a richer and more flexible body of data for later analysis. The inherent limitations of such a data collection effort must be recognized, however. Except for a few items which may solicit retrospective information, the mid-decade effort, like the decennial censuses, must focus on period data, that is, information depicting conditions at a particular point in time. The need to monitor or gauge important social changes and movements cannot adequately be met by means of observed net differences over time.

Gross flows and transactions can only be estimated via some kind of longitudinal surveys whereby the same units of observation can be traced through time. In short, the mid-decade effort must be regarded as a means for testing the initial framework and providing it with a set of base line observations. The true research value of that framework can only be realized if subsequent data collection efforts are made congruent with the same basic framework.[18]

The guiding principles for such an effort include recognizing that first, the basic task is one of information processing rather than data collection; second, that the major purpose of information processing is to provide objective, accurate, timely, and relevant information to policymakers; third, the relevance to the needs of policymakers implies the development of a variety of representational entities which reflect complex social realities; fourth, that the goal is to deepen our understanding of social processes, rather than merely to describe more fully our current condition; and finally, that the data collected must be analyzed and presented within a normative framework so as to inform us as to our progress toward our social goals and objectives.[19]

Juster's "Time-Use Estimation for Economic and Social Accounting;" Richard Ruggles et al, "Integrated Conceptual and Statistical Framework for Social Indicators;" and Nestor E. Terleckyj *et al.*, "Collaborative Research on the Analytic Capabilities of a Goals Accounting System." The three projects are currently funded by the National Science Foundation's Division of Social Sciences. Policymakers must also be brought into the act. For insight on how this might be accomplished, see Judith Innes de Neufville, *Social Indicators and Public Policy* (Amsterdam: Elsevier Scientific Publishing Company, 1975); Dennis L. Little, "Social Indicators and Public Policy," *Futures*, 7:1 (February 1975), pp. 41–51; and Richard Rose, "The Market for Policy Indicators," in Andrew Shonfield and Stella Shaw (ed.), *Social Indicators and Social Policy* (London: Heinemann Educational Books, Ltd., 1972), pp. 119–141.

[18] Censuses and large-scale social surveys are not the only vehicles which can provide useful base line estimates for subsequent analysis of social change. Many smaller-scale studies also merit replication. On this point, see Otis Dudley Duncan, *Toward Social Reporting: Next Steps* (New York: Russell Sage Foundation, 1969). For insight into the technical problems encountered in trying to estimate gross flows over time, see Abbott L. Ferriss, *A Test of Demographic Accounting Methods with U.S. Data on Education* (Atlanta, Ga.: Emory University, Interim report, September 15, 1976.)

[19] If the involvement of social indicators and social accounting with political issues is inescapable, their involvement with questions of social philosophy is equally inevitable. For insights with respect to these problem areas, see Peter J. Henriot, *Political Aspects of Social Indicators: Implications for Research* (New York: Russell Sage Foundation, 1972); Isabel V. Sawhill, "Social Indicators, Social Accounting and the Future of Society," in Albert Somit (ed.), *op. cit.*, pp. 114–127; Wolfgang Zapf, "Systems of Social Indicators: Current Approaches and Problems," *International Social Science Journal*, XXVII: 3 (1975), pp. 479–497, and Mancur Olson, Jr., "Social Indicators and Social Accounts," *Socioeconomic Planning Sciences*, Vol. 2 (1969), pp., 335–346.

CURRENT DEVELOPMENTS

PRICES GO DOWN FOR BEA MAGAZINES

Starting May 1977, the subscription prices go down 61% for the *Survey of Current Business* and 28% for the *Business Conditions Digest,* according to the Bureau of Economic Analysis of the Department of Commerce.

New subscription prices are $19.00 a year for the *Survey of Current Business* and $40.00 a year for the *Business Conditions Digest.*

The reduction for the *Survey of Current Business* was achieved by obtaining second class mailing privileges and making the *Survey's* weekly statistical supplement a separate subscription.

Present subscribers will continue to receive the weekly statistics until their present subscriptions to the *Survey* expire. Those who wish then to continue to receive a weekly service updating the data in the statistical (blue) pages of the *Survey* should subscribe to it under its new name *Weekly Business Statistics.* The price is $15.00 a year, mailed first class. Copies will be available by subscription only; no single copies will be sold.

The reduction for *Business Conditions Digest* was achieved by a modest reduction in the number of pages and by eliminating the 4-page *Advance Business Conditions Digest. Business Conditions Digest* will continue to be mailed first class.

Subscriptions should be placed with Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Payment must be enclosed. Make checks payable to Superintendent of Documents.

The reductions were worked out in cooperation with the U.S. Government Printing Office and the U.S. Postal Service.

Price list:

SURVEY OF CURRENT BUSINESS
Annual subscription: $19.00 domestic; $23.75 foreign
Single copy: $1.60 domestic; $2.00 foreign

WEEKLY BUSINESS STATISTICS
Annual subscription: $15.00 domestic; $18.75 foreign
No single copies sold.

BUSINESS CONDITIONS DIGEST
Annual subscription: $40.00 domestic; $50.00 foreign
Single copy: $3.50 domestic; $4.50 foreign

(AGO AMBRE, BUREAU OF ECONOMIC ANALYSIS, DEPARTMENT OF COMMERCE, telephone (202) 523-0777.)

1977 EMPLOYMENT AND TRAINING REPORT OF THE PRESIDENT

The 15th annual Employment and Training Report of the President is now available. The report includes both the Department of Labor's report on employment and training requirements, resources, and utilization and DHEW's report on facilities utilization and employment and training program coordination under the Comprehensive Employment and Training Act (CETA). Chapters appearing in the report include:

Employment and Unemployment in 1976. Labor force developments in 1976, including employment trends, characteristics of unemployed workers, labor force composition, earnings, and productivity are each discussed as they contributed to the year's record.

Measurement of Employment and Unemployment. The currently used system of measuring employment and unemployment is reviewed in the historical context of its development. In considering future changes in methodology, the chapter concludes with a preview of the agenda of the recently constituted National Commission on Employment and Unemployment Statistics.

Reviewing Program Performance: An Overview of Fiscal 1976. Major programs administered by the Department of Labor, including CETA, the Work Incentive Program, unemployment com-

pensation, and apprenticeship programs, are reviewed in terms of their fiscal 1976 performance.

The Employment Service in 1977. The Employment Service is discussed in terms of its current structure, operating procedures, and program emphasis. The discussion then shifts to policy issues which may have implications for future operations of the Employment Service.

The Automobile Industry and its Labor Force. Continuing a series which focuses on individual industries, the chapter opens with a discussion of the automotive industry and characteristics of its labor force. The discussion then turns to employment conditions within the industry, including wages and hours, unionization, collective bargaining agreements, and minority and female employment.

The report, which also contains a 162-page statistical appendix, may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for $2.75 per copy. (FLORENCE CASEY, EMPLOYMENT AND TRAINING ADMINISTRATION, DEPARTMENT OF LABOR, telephone (202) 376-6620.)

NATION'S USE OF HEALTH RESOURCES

The National Center for Health Statistics has recently issued a report entitled, *The Nation's Use of Health Resources,* 1976 edition.

This new report from the National Center for Health Statistics presents data on the use of ambulatory, hospital, institutional, and home health services in terms of visits, discharges, patient care episodes, and residents. Data were available on the age, sex, color, family income, and diagnostic condition of those receiving care are included. In addition, estimates of the total number of persons served one or more times during the target year, in this case 1973, are presented for various facilities. There are also discussions of the collection, analysis, and potential uses of data from each type of provider.

Through the cooperation of a wide variety of Federal and nonfederal health data collection agencies, this report provides documentation of health resources utilization at the national level. It is envisioned that the next publication in this series will contain both regional and state data, and that the utilization of health support services, such as health transportation systems, medical laboratories, and pharmaceuticals, will also be inventoried.

Single copies of this 104-page report (DHEW Publication No. (HRA) 77–1240) are available free of charge from NCHS, Room 8–20, 5600 Fishers Lane, Rockville, Maryland 20857, Attention: M. Flaer, or call (301) 433-NCHS. (LOUISE KIRBY, NATIONAL CENTER FOR HEALTH STATISTICS, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (301) 443-1200.)

NATIONAL HEALTH EXPENDITURES, FISCAL YEAR 1976

The Nation's spending for health reached $139.3 billion in fiscal year 1976—about $638 per person. The largest chunks of the health care dollar went for hospital care (40%), physicians' services (19%), and drugs and drug sundries (8%). The percentage of GNP attributed to health care rose to 8.6%, the largest proportion ever.

These figures are taken from the April 1977 *Social Security Bulletin* article "National Health Expenditures, Fiscal Year 1976." The article gives data as far back as 1929. Changes brought about by the Medicare and Medicaid programs (in operation since 1965) are noted, as are developments pre- and post-Economic Stabilization Program (August 1971–April 1974). Trends of third-party financing and growth in public programs are also discussed.

Private expenditures amounded to 58% of total health spending (the lowest level recorded in any year for which series data are available); public funds—from Federal, State, or local governments—accounted for 42%. Personal health care expenditures (those for health services and supplies received directly by individuals) were about $552 per person. Of this amount, about $179 was paid out-of-pocket by the person, $144 was covered by private health insurance, $222 was paid by government, and $7 was paid by philanthropy and private industry.

Reprints of this article are available without charge from the Publications Staff, Office of Research and Statistics, Social Security Administration, Room 1120, 1875 Connecticut Ave., N.W., Washington, D.C. 20009, telephone (202) 673-5209). The *Social Security Bulletin* is available by subscription at $14 per year, through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. (ROBERT E. ROBINSON, SOCIAL SECURITY ADMINISTRATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (202) 673-5209.)

NATIONWIDE DATA ON MINORITIES AND WOMEN IN SCHOOLS

The U.S. Equal Employment Opportunity Commission (EEOC) recently released a publication entitled *Employment Opportunity in the Schools: Job Patterns of Minorities and Women in Public Elementary and Secondary Schools, 1974.*

The report is the first comprehensive look at the status of minorities and women throughout the occupational spectrum of public school employment. The national and state employment estimates are based on reports from the 6900 school systems participating in the Commission's 1974 EEO-5 survey.

The report delineates public school employment by 18 detailed occupations and six mutually exclusive race/ethnic groups (by sex). Major findings in the study include:

—Employment opportunities in elementary and secondary education were generally open to blacks, American Indians, and women, but somewhat less open to Spanish-surnamed Americans and Asian Americans.

—Regardless of their overall participation in the field, women and all minority groups except American Indians held less than their fair share of the top-paying, policymaking administrator and principal positions.

—Spanish-surnamed Americans, Asian Americans, and American Indians were underrepresented among both elementary and secondary teachers.

—Blacks and women were represented well in teaching posts at the elementary level, but not at the secondary level.

—Four of every ten members of minority groups, compared with two of every ten whites, were employed in the three low-paying occupations of teacher aides, service workers, and laborers.

—Unlike men, women were predominantly elementary teachers. In addition, a much greater proportion of women than men were employed in the teacher aid and clerical categories, both of which are relatively low paying.

Employment Opportunity in the Schools: Job Patterns of Minorities and Women in Public Elementary and Secondary Schools, 1974 may be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at $4.10 a copy. The stock number is 052–015–0030–8. A limited number of single copies are available without cost from the Publications Unit, Equal Employment Opportunity Commission, 2401 E Street, N.W., Washington, D.C. 20506, telephone (202) 634-7649. (SUZANNE REIFERS, U.S. EQUAL EMPLOYMENT OPPORTUNITY COMMISSION, telephone (202) 634-6930.)

CHARACTERISTICS OF OLDER WOMEN SOCIAL SECURITY BENEFICIARIES

"Aged Women OASDI Beneficiaries: Income and Characteristics, 1971," an article in the April 1977 *Social Security Bulletin,* examines selected benefit characteristics—primary insurance amount, entitlement status, and actuarial reduction—of women aged 62 and over. The article discusses the relationship between these characteristics, the receipt of income from other sources, and the size of total income in 1971. The data base is the 1972 Social Security Survey of the Status of the Elderly.

Special attention is given to age variations in beneficiary and income factors and to the disadvantageous economic situation of the oldest cohorts of aged beneficiary women. A major conclusion is that their lower incomes were largely due to the fact that OASDI cash benefits are not adjusted to reflect rising wage levels after retirement or to steady increases in the taxable maximum.

Reprints of this article are available without charge from the Publications Staff, Office of Research and Statistics, Social Security Administration, Room 1120, 1875 Connecticut Ave., N.W., Washington, D.C. 20009, telephone (202) 673-5209. The *Social Security Bulletin* is available by subscription, at $14 per year, through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. (ROBERT E. ROBINSON, SOCIAL SECURITY ADMINISTRATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (202) 673-5209.)

RATE OF RETURN ON SOCIAL SECURITY BENEFITS TO WORKERS

The Office of Research and Statistics, Social Security Administration has released a publication entitled *Studies in Income Distribution: Internal Rates of Return to Retired Worker-Only Beneficiaries Under Social Security, 1967–70.*

This 67-page publication presents empirical analysis of the real internal rate of return to the old age insurance (OAI) portion of the old-age, survivors, and disability insurance (OASDI) program for worker-only beneficiaries retiring between 1967 and 1970. The analytical background for this study is reviewed in Section I. The issues concern alternative measures of individual equity and the empirical approach to their measurement. This section also describes the procedures used in five papers on the subject by five other authors. Sections II and III describe the basic method employed and the results, as well as the use of a random sample of longitudinal microdata on actual earnings histories, the feature which distinguishes the authors' approach from previous studies. The final section compares the authors' results with those of other studies and sets out plans for extension of the analysis.

Single copies of *Studies in Income Distribution: Internal Rates of Return to Retired Worker-Only Beneficiaries Under Social Security, 1967–70* (HEW Publication No. (SSA) 77–11776) are available from the Publications Staff, Office of Research and Statistics, Social Security Administration, Room 1120, Universal North Building, 1875 Connecticut Avenue, N.W., Washington, D.C. 20009. (ROBERT E. ROBINSON, SOCIAL SECURITY ADMINISTRATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (202) 673-5209.)

SOCIAL SECURITY INDEXING OF WORKERS' EARNINGS: THE FOREIGN EXPERIENCE

The Office of Research and Statistics, Social Security Administration, has recently released Staff Paper No. 25—*Protecting Social Security Beneficiary Earnings Against Inflation: The Foreign Experience.* The report discusses how six foreign countries revalue past wages to protect social security benefits in force and newly awarded benefits against inflation. The formulas used by the study countries—Belgium, Canada, France, West Germany, Norway, and Sweden—are applied to the wage record of an average American worker born in 1905 and retiring at the end of 1970. The results are then compared to determine which method would yield the greatest amount of revaluation.

Single copies of *Protecting Social Security Beneficiary Earnings Against Inflation: The Foreign Experience,* Staff Paper No. 25, (HEW Publication No. (SSA) 77–11850) are available from the Publications Staff, Office of Research and Statistics, Social Security Administration, Room 1120, Universal North Building, 1875 Connecticut Avenue, N.W., Washington, D.C. 20009. The report can also be purchased from the Superintendent of Documents, GPO (Stock No. 017–070–00293–5) for 85 cents. (ROBERT E. ROBINSON, SOCIAL SECURITY ADMINISTRATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (202) 673-5209.)

SOCIAL SECURITY BULLETIN REPORTS

The Office of Research and Statistics in the Social Security Administration has announced the availability of the following reports which are briefly highlighted below.

Work Status and Income Change, 1968–72: Retirement History Study Preview (Social Security Bulletin, December 1976). This article analyses income change in the 4 years after base line interview, classified by work status in 1968 and 1972. Of those who had stopped working, substantially more married men than nonmarried men or women reported pensions other than social security benefits. The drop in real income for all was 40–45%, though initial incomes were far higher for persons or couples with other pensions. Persons not employed over the entire period experienced a rise in their initially very low incomes, probably as a result of social security increases. The income of persons who remained employed through 1972 kept pace with living costs.

Retirement History Study's First Four Years: Work, Health, and Living Arrangements (Social Security Bulletin, December 1976). This report describes some of the changes that have taken place over a 4-year period in the lives of the cohort of retirement-age persons being followed by the Social Security Administration's Retirement History Study. Changes in work life, health, and family life and living arrangements are noted for men and women separately as they aged from the preretirement years (58 to 63) to the more typical retirement ages (62 to 67). The descriptive information presented here will be followed by a series of in-depth analyses examining the ways retirement affects the other changes experienced by this cohort of individuals as they begin the retirement process.

OASDI: Fiscal Basis and Long-Range Cost Projections (Social Security Bulletin, January 1977). Understanding of the financing structure of social security is a prerequisite to serious discussion of the program's financial condition. Clearly, the most important test of its financial soundness is whether expected future income equals expected outgo. Short and long-range cost estimates indicate that this condition does not exist and an actuarial deficit of 7.96% of taxable payroll, equal to $4.3 trillion, must be eliminated—maybe half of it by stabilizing benefits at current levels in relation to preretirement earnings. An unfunded accrued liability also exists, but the need for funding it is not indicated.

Social Welfare Expenditures, Fiscal Year 1976 (Social Security Bulletin, January 1977). In 1976, for the second fiscal year in a row, public expenditures for social welfare purposes expanded at an abnormally high rate. Even after adjusting the 16% increase in aggregate expenditures for price and population changes, the 8% real growth rate proves to be the highest since 1971. The $45 billion rise in social welfare expenditures to a total of $331 billion reflects the effects of both recession and inflation. A further indication is the rise in the proportion of the Nation's gross national product devoted to social welfare expenditures from 19.7% in 1975 to 20.6% in 1976.

The Survey of The Low-Income Aged and Disabled: An Introduction (Social Security Bulletin, February 1977). Shortly before the Social Security Administration started distributing supplemental security income (SSI) checks, the Bureau of the Census completed interviews with 11,359 aged and disabled welfare recipients and 6,192 aged and disabled poor persons in the general population. These data were collected for the Social Security Administration in 1973. Matched with comparable data gathered from the same respondents in 1974, they make up the Survey of Low-Income Aged and Disabled (SLIAD). Its findings will be used to assess the effect of SSI upon the needy aged and disabled.

State Supplementation Under SSI, 1975 (Social Security Bulletin, February 1977). This article summarizes State supplementation activities under SSI for 1975. It discusses changes in the State programs that occurred during 1975 and presents some comparisons with data for 1974—the initial year of the SSI program. A slight shift occurred in the distribution of recipients by eligibility category for Federal and State supplementation from 1974 to 1975. During 1975 a few States changed from Federal administration to State administration of their mandatory supplementation programs while a few others initiated or expanded their optional supplementation programs. Several States also increased their supplements during the year.

Single copies of the above publications are available for official use from the Publications Staff, Office of Research and Statistics, Social Security Administration, Department of Health, Education, and Welfare, Room 1120, 1875 Connecticut Avenue, N.W., Washington, D.C. 20009, telephone (202) 673-5209. (ROBERT E. ROBINSON, SOCIAL SECURITY ADMINISTRATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (202) 673-5209.)

DOD MANPOWER RESEARCH STUDIES

The Defense Manpower Data Center, has recently released a report entitled *Male Chargeable Accessions: Evaluation by Mental Categories (1953–1973).*

The data presented in this report are historical data dealing with U.S. male military accessions; namely, with male youths who entered the military service either by induction or by voluntary enlistment. The data covered a period of 21 years: from 1953 through 1973: namely, from the end of the Korean War (1953), through the Berlin Crisis (beginning in 1960), through the Vietnam War (from 1965 through 1972) and ending in 1973, when the Selective Service draft was ended. The report presents a qualitative evaluation of these accessions in terms of their distribution by mental category, as determined by their percentile score on the Armed Forces Qualification Test (AFQT).

The data are differentiated by type of accession (induction or enlistment), by race (Caucasian and Non-Caucasian), and by Service (Army, Navy, Marine Corps, and Air Force), and are shown in detail in tables on a year-by-year basis. These yearly data have also been condensed into three septennial periods—1953–1959, 1960–1966, and 1967–1973. A basic analysis of these data is provided. The various mental tests used and the mental standards applied for qualification purposes are fully described.

Copies of this 143-page report (No. NR 77–1, January 1977) may be obtained from Defense Manpower Data Center, 300 North Washington St., Alexandria, Virginia 22314, telephone (703) 325-0540. (BERNARD KARPINOS, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (MANPOWER AND RESERVE AFFAIRS), DEPARTMENT OF DEFENSE, telephone (703) 325-0540.)

DIAGNOSES FOUND IN VA HOSPITALS

The Most Frequently Occurring Diagnoses in VA Hospitals 1971–1976: A Statistical Review (February 1977) presents a detailed analysis of the diagnoses found in VA hospital experience from 1971 through 1976. As reported in the monograph, the most frequently occurring diagnoses among discharges from VA hospitals during this period were heart disease, alcoholism and alcohol related diseases, malignant neoplasms, psychoses, and diabetes mellitus. Where feasible, the study compares VA data with the 1972 National Hospital Discharge Survey of the National Center for Health Statistics.

Single copies of *The Most Frequently Occurring Diagnoses in VA Hospitals 1971–1976: A Statistical Review* (VA Controller Monograph No. 4) are available from the Veterans Administration, Office of the Controller, Reports and Statistics Service (042A2), Washington, D.C. 20420. The report may also be purchased for $1.45 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, GPO Stock No. 051–000–00104–4. (LOUISE MESARD, REPORTS AND STATISTICS SERVICE, VETERANS ADMINISTRATION, telephone (202) 389-3458.)

VETERANS' EDUCATION PROGRAMS

Information Bulletins relating to veterans' education programs are published three times during the fiscal year. The months of November and April are chosen as reporting months because they are traditionally the months of peak fall and spring enrollment under the GI bill education program. The June 1976 Information Bulletin relates primarily to training taken during fiscal year 1976 but also contains data for prior fiscal years.

With the completion of fiscal year 1976, ten years plus one month had passed since veterans and service personnel were first able to receive educational benefits under the post-Korean conflict GI bill. In this period of time over 6.5 million veterans or active duty personnel have been trained. In fiscal year 1976 alone, 2.8 million persons trained—more than 43% of all veterans and service personnel who ever trained under the post-Korean GI bill or about one-sixth of all the persons trained under all three GI bills (World War II, Korean conflict, post-Korean conflict) combined. In addition, during fiscal year 1976 another 100,000 dependents received educational benefits under the Dependents Educational Assistance program and 29,000 disabled veterans trained under the Vocational Rehabilitation program.

Single copies of *Veterans Benefits Under Current Educational Programs* (Information Bulletin 04–77–1, June 1976) are available from Reports and Statistics Service (042A1), Office of the Controller, Veterans Administration, Washington, D.C. 20420. (MICHAEL FACINE, VETERANS ADMINISTRATION, telephone (202) 389-3930.)

EMPLOYMENT AND TRAINING RESEARCH CATALOG

The latest catalog of research and development projects under contract or grant from the Employment and Training Administration (ETA) has been published by the Department of Labor.

The sixth annual edition of *Research and Development Projects* summarizes the projects funded by ETA's Office of Research and Development that were active on September 30, 1976, and all those completed between July 1, 1973 and September 30, 1976.

The catalog is the principal means of informing the public about current research in the employment and training field. The publication is of particular use to Federal and state research and development personnel, employment and training officials and practitioners, academicians, prospective applicants for grants and contracts, and industrial and personnel relations people.

The projects and publications are grouped by subject matter. The catalog also includes with each entry a summary of the subject matter.

For persons interested in submitting proposals for research and development projects, the ap-

pendix contains guidelines for submitting proposals. Also included in the 289-page publication is a portion of Section 311 of the Comprehensive Employment and Training Act (CETA), which authorizes the activity.

There are also explanations of the institutional, dissertation, and small-grant research programs, and a list of active and recently completed research projects concerning the impact of U.S. foreign trade and investment policies on American labor.

Copies of the catalog may be obtained without charge from the Inquiries Office, Employment and Training Administration, U.S. Department of Labor, Room 10225, 601 D St., N.W., Washington, D.C. 20213. (ELZORA WILLIAMS, EMPLOYMENT AND TRAINING ADMINISTRATION, DEPARTMENT OF LABOR, telephone (202) 376-6730.)

RECENT LEAA REPORTS

The following are descriptions of recent publications of the Statistics Division of the National Criminal Justice Information and Statistics Service of the Law Enforcement Assistance Administration.

Criminal Victimization in the United States: A Comparison of 1974 and 1975 Findings (67 pp.) is the second in a series of annual reports dealing with year-to-year change in victimization rates for selected crimes measured by the National Crime Survey. Comparisons are made, using data from 1974 and 1975, for rape, robbery, assault, burglary, larceny, and motor vehicle theft. A brief discussion of trends in victimization rates from 1973 to 1975 also is included. Information is presented on the use of weapons in the commission of crimes and on the reporting of crimes to the police. The data were collected for the Law Enforcement Assistance Administration by the Bureau of the Census and were based on personal interviews with a representative sample of about 65,000 households and 15,000 commercial firms throughout the United States.

Criminal Victimization in the United States: 1973 (162 pp.) is a report based on the results of representative surveys of the population and places of business throughout the United States. This report gives an assessment of the impact and nature of criminal offenses that are of major public and official concern. It is the most comprehensive collection of data yet released under the National Crime Panel program. Information from 100 statistical tables is descriptively analyzed in detail, and a special section highlights salient findings. Major topical areas covered include victim characteristics; victimization of central city, suburban, and nonmetropolitan residents; victim-offender relationship; crime characteristics; and reporting of crimes to the police. Data on the characteristics of offenders involved in personal crimes of violence are examined for the first time.

Expenditure and Employment Data for the Criminal Justice System, 1975 (376 pp.) is the ninth in a series of annual reports on criminal justice activities in the United States. This report presents expenditure data for fiscal year 1975 and employment data for the month of October 1975. Specific data are supplied for the Federal Government, each of the 50 State governments, and the aggregate local level of government within each State. Survey coverage was designed to produce reliable estimates for each State of the percentage of State and local law enforcement expenditure funded and expended by units of general local government from their own revenue sources. Data are published separately for the aggregate county governments and the aggregate municipal governments (cities and townships) within each State, for each of the 334 counties with a 1974 population of 100,000 or more, and for the 394 cities with a 1973 population of 50,000 or more. Also, data are shown for the 17 largest standard metropolitan statistical areas. The presentation of the tables is organized into two major parts—the summary "Criminal Justice System" section showing the interrelationships among the various sectors of the system, and the six "Sector" sections providing, where possible, a further breakdown of data on a particular criminal justice activity. The six sectors of criminal justice activity covered in this report are: police protection, judicial, legal services and prosecution, public defense, corrections, and other criminal justice.

Prisoners in State and Federal Institutions on December 31, 1975 (50 pp.) is published as part of the National Prisoner Statistics program. It presents data for 1975 on the number and movement of prisoners sentenced to a maximum term of more than a year who are held in custody by State and Federal correctional institutions. The report examines the size and distribution of the year-end prisoner population at the national level and, in the case of the State

inmate population, at regional and State levels as well. The ratio of male to female prisoners is discussed. Special attention is paid to year-to-year change in the size of the prisoner population and to the types and number of admissions and departures that occurred during 1975. A special table provides a count of the total prison inmate population, including both those with maximum sentences of more than a year and those with shorter sentences or no sentence.

Prisoners in State and Federal Institutions on December 31, 1976: Advance Report is also published as part of the National Prisoner Statistics program. This is the first annual advance report in this series. The initiation of this new report represents a major effort to release year-end prisoner counts to the public shortly after the close of the year.

Census of Prisoners in State Correctional Facilities, 1973 (221 pp.) is published as part of the National Prisoner Statistics program. This report presents data, on a State-by-State basis, derived from the 1973 Census of Prisoners in State Correctional Facilities. Information is given on inmates sentenced as adult or youthful offenders to a maximum term of at least 1 year and 1 day who were being held in the custody of State correctional systems as of midnight June 30, 1973. Each State study is similar in scope, treating such inmate characteristics, differentiated by race, as sex, age, educational attainment, most serious offense for which held, maximum sentence length, and length of time served. A brief national overview, discussing similarities and differences among State inmate populations, also is included.

Children in Custody: Advance Report on the Juvenile Detention and Correctional Facility Census of 1974 (63 pp.) presents preliminary findings from the 1974 Census of Juvenile Detention and Correctional Facilities, which was the third in a series of surveys of such facilities operated by State and local governments. Unlike its predecessors, the 1974 project covered privately operated juvenile detention and correctional facilities as well as public ones. The advance report shows, for public facilities in each state and LEAA region, the number of facilities and juveniles held, the detention status of juveniles held, the kinds of offenses of adjudicated delinquents and persons declared in need of supervision, staffing, and expenditures. Several of these 1974 statistics are compared with 1971 and 1973. The 1974 private facility data shown are similar in nature to the variables presented for public facilities.

Single copies of these reports are available from the National Criminal Justice Reference Service, P.O. Box 24036, S.W. Station, Washington, D.C. 20024. (ROGER LESSER, LAW ENFORCEMENT ASSISTANCE ADMINISTRATION, U.S. DEPARTMENT OF JUSTICE, telephone (202) 376-3899.)

RECENT NSF REPORTS

The following four reports have recently been released by the National Science Foundation:

Women and Minorities in Science and Engineering (NSF 77–304) focuses on two separate but intertwined issues—whether there is a problem or series of problems related to the employment of women and minorities in the scientific and engineering labor force, or whether there is an underutilization of women and minorities as a human resource in science and engineering, and, if so, to what extent, and why.

Copies of the report are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for $.75 per copy, stock number 038–000–00307–1.

Characteristics of the National Sample of Scientists and Engineers, 1974, Part 3. Geographic (NSF 76–330) reports on the 1974 National Survey of Scientists and Engineers conducted for NSF by the Bureau of the Census. This third report in the series covers geographic characteristics of almost 1.1 million scientists and engineers. The data show the concentration and Federal support of these individuals by State. Detailed statistics are shown for those working in Standard Metropolitan Statistical Areas by field, highest degree, type of employer, primary work activity, and salary.

Copies of the report are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for $2.00 per copy, stock number 038–000–00308–9.

Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Year 1975, 1976, and 1977, Vol. XXV (NSF 77–301) is the latest in an annual series that presents data on Federal funding levels by overall totals and by selected subcategories. The data cover all Federal agencies that sponsor R&D distribution by State, and university research by field of science. Obliga-

tional data are also given for R&D plant and scientific and technical information.

Copies of the report are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for $1.45 per copy, stock number 038–000–00310–1.

Reviews of Data on Science Resources, No. 28, "Scientists and Engineers From Abroad: Trends of the Past Decade, 1966–75" (NSF 77–305) summarizes the trends of scientist and engineer immigration of the 1966–75 period and relates these trends to economic factors. Included in the information are the annual flows, continent of last permanent residence, and detailed occupations of permanent immigrant scientists and engineers.

Copies of the report are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for $.35 per copy, stock number 038–000–00309–7. (CHARLES E. FALK, DIVISION OF SCIENCE RESOURCES STUDIES, NATIONAL SCIENCE FOUNDATION, telephone (202) 634-4634.)

INDIVIDUAL INCOME TAX RETURNS

The Internal Revenue Service has recently released the *Preliminary Report, Statistics of Income—1975, Individual Income Tax Returns.* The new report is based on samples from the more than 82 million individual income tax returns filed during calendar year 1976.

Data highlighted are sources of income, deductions, exemptions, and income tax by size of taxpayers' adjusted gross income (AGI) for the Nation. Estimates are also included for each State. The report includes preliminary data on such new items on the 1975 returns as the deduction for contributions to individual retirement accounts, the earned income credit, personal exemptions credit, and credit for a new principal residence. In addition, as required under section 2123 of the Tax Reform Act of 1976, the new publication also highlights information covering high-income individual income tax returns classified by size of AGI as well as by three new income concepts: (1) Expanded income, which is the result of combining AGI and tax preferences and subtracting investment interests; (2) AGI plus tax preferences; and (3) AGI less investment interest. A detailed analysis of high-income returns was released concurrently with the new IRS report by Treasury's Office of Tax Analysis. More comprehensive statistics from individual income tax returns will be published in the complete IRS report for 1975, scheduled for publication later this year.

Copies of the 36-page *Preliminary Report, Statistics of Income—1975, Individual Income Tax Returns,* may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for $0.75 each. (JACK BLACKSIN, STATISTICS DIVISION, INTERNAL REVENUE SERVICE, telephone (202) 376-0155.)

BUSINESS INCOME TAX RETURNS, 1973

The Internal Revenue Service has recently released the complete report, *Statistics of Income—1973, Business Income Tax Returns* with accounting periods ended July 1973 through June 1974. The report presents financial and economic data from the returns of sole proprietorships and partnerships. Data are classified by industry and size of business receipts. State data for both sole proprietorships and partnerships are shown.

Special topics in the 1973 report include sole proprietors classified by size of net profit and partnerships with depreciable assets classified by size of business receipts. Balance sheet data for partnerships, which are compiled biennially, are also provided in this issue.

Copies of the 254-page report may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for $3.25. (E. JOHN DIPAOLO, STATISTICS DIVISION, INTERNAL REVENUE SERVICE, telephone (202) 376-0151.)

FORMATION OF THE INTERNATIONAL ASSOCIATION FOR STATISTICAL COMPUTING

This is to announce the formation of the International Association for Statistical Computing (IASC), a section of the International Statistical Institute. IASC will be open to membership among those interested in promoting the theory, methods, and practice of statistical computing. The objectives of the Association will be to foster interest and knowledge in effective statistical computing through international contacts among statisticians, computing professionals, organizations, institutions, governments, and

the general public in different countries of the world. The Association will pursue its objectives throughout the world with special attention to developing countries. It will promote collaborative efforts with international, national, regional, and other organizations and institutions having similar aims; it will foster evaluations of statistical computing techniques and programs, and will facilitate the exchange of computer programs and their documentation. The Association will arrange programs and meetings, particularly in conjunction with sessions of the International Statistical Institute. Many statisticians and computer experts have been working on an international cooperative basis towards the founding of the IASC, which will formally come into existence and have its inaugural meeting in December 1977 during the 41st Session of the International Statistical Institute in New Delhi, India.

For further information, including details of membership, contact:

International Statistical Institute
428 Prinses Beatrixlaan
Voorburg, Netherlands

Annual individual member's dues structure is: (1) members from developed countries, $15 per year; and (2) members from developing countries who request a reduced rate, $7 per year. (E. LUNENBERG, DIRECTOR OF THE PERMANENT OFFICE, INTERNATIONAL STATISTICAL INSTITUTE, VOORBURG, NETHERLANDS.)

NEW REPORTING PLANS AND FORMS

The following gives a brief description of a new reporting plan and form approved between March 1 and March 31, 1977 by the Office of Management and Budget under the provisions of the Federal Reports Act. The description refers to surveys and data collection programs which are just being started or are soon to be started so results are not yet available.

Department of Agriculture

Statistical Reporting Service

Environment and Corn Yield Study (singletime).—The purpose of this study is to evaluate and conduct a sensitivity study of the Minimum Data Corn Yield Model designed by Dr. E.C.A. Runge of the University of Missouri. This model is capable of producing on August 1 forecast of corn yield in bushels employing the following variables: soil moisture at time of planting, average weekly maximum temperature for each of the 6 weeks before and each of the 4 weeks after tasseling, and total weekly precipitation for each of the 6 weeks before and each of the 4 weeks after tasseling.

The sensitivity study is designed to determine how the model reflects weather and other environmental effects in forecasting final corn yields. The study will entail an analysis of the importance of each variable employed by the model. It will also examine several methods for measuring the different variables to permit selection of measurement techniques to create an optimum minimum data model. If this portion of the study is successful, the Statistical Reporting Service would have available an inexpensive early yield forecast model for estimating corn yield. (For further information: BENJAMIN F. KLUGH, JR., STATISTICAL REPORTING SERVICE, DEPARTMENT OF AGRICULTURE, telephone (202) 447-4795).

OTHER REPORTING PLANS AND FORMS

Shown below, by agency, is a list of new reports approved between March 1 and March 31, 1977, excluding those described above. Requests for copies of these reports should be addressed to the public reports clearance officer of the sponsoring agency. A list of agency clearance officers may be obtained by writing to Marsha Traynham, Statistical Policy Division, Office of Management and Budget, Washington, D.C. 20503.

During March approximately 86 forms reached their expiration dates and are no longer approved for use.

DEPARTMENT OF AGRICULTURE

- Application and Promissory Note for Weatherization Loan
- Survey of Food Wholesalers

DEPARTMENT OF COMMERCE

- Point of Purchase Questionnaire, Consumer Item Checklists
- 1977 Census of Transportation, Nonregulated Bus and Motor Carrier Survey
- 1977 Rural Relist Test
- (Part of 1980 Decennial Census of Population and Housing) Special Census Prelist Address Register—1977 Census of Oakland, California
- Nonhousehold Sources Census Record Search and Telephone Follow-up Verification Record
- Professional Service Firm or Organization Interview Record; Professional Service Association Member Report
- Distribution of Sales by Class of Customer
- 1977 Census of Manufacturers
- Pneumatic Tires
- Application for Financial Assistance
- Methodology Study—Marine Recreational Fisheries Statistics
- Application for Commission in the National Oceanic and Atmospheric Administration Corps
- Seafood Opinion Survey
- 1977 Worldwide Shipping Plot Questionnaire
- Report of Revenues Earned for Calendar Year, Cumulative Quarterly Period Ending or Other Cumulative Period Ending
- Microwave Oven Usage Survey

DEPARTMENT OF DEFENSE

- DOD Contractor Report of Foreign Purchases
- Survey of Military Retirees

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

- Survey of Teachers' Language Skills
- Registry of Research Organizations in Education
- A Study of the Use of Education and Training Funds in the Private Sector
- Survey of Selected External Degree—Program Graduate
- Program Memorandum—Application, Library Services and Construction Act Program, Titles I and II
- Cost and Characteristics Questionnaires and Cost Data Interview Guide—Compensatory Education Study
- Questionnaire Interview for Physical Education Directors
- Study of Epidemiology of Flavobacterium Meningosepticum Infections
- Swine Flu Immunization Program—Survey of Estimated Costs
- Alcoholism Treatment Centers Long-Term Follow-up Study
- Cancer Education Study
- Survey of Head Start Assessment Instruments and Procedures
- National Study on Selected Issues of Social Services to Children and Their Families
- Project Head Start Program Information Report
- Instruction for Completing Application for Federal Assistance for Rehabilitation Services Administration Training Grants
- National Inventory of Optometrist

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

- Family and Financial Data to Support Special Forbearance or Request for Assignment of Mortgages
- Section 106(B) Nonprofit Sponsor Assistance "Seed Money" Loan Application
- Affirmative Marketing Plan Survey
- Survey Form—Contractor; Survey Form—Indian/Alaska Native
- Application for Coinsurance Benefits (Multifamily)

DEPARTMENT OF THE INTERIOR

- Minimum Roof Control Plan Report
- Conditions in the Active Workings of the Coal Mine
- Outdoor Recreation Telephone Survey 1977

DEPARTMENT OF LABOR

- Survey to Assess the Impact of Employee Retirement Income Security Act on Administrative Costs of Small Pension Plans

DEPARTMENT OF TRANSPORTATION

- The Nationwide Boating Survey
- State Boating Safety Program Checklist
- Minority Business Enterprise Information Sheet

Bay Area Rapid Transit Impact Program Workplace Survey of Travel Behavior

DEPARTMENT OF THE TREASURY

Antirecession Special Report

ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

Questionnaire for Manufacturers, Distributors and Researchers Currently Involved in Wind Energy Systems Development

Assessment of Industry Energy Research and Development

NATIONAL FOUNDATION ON THE ARTS AND HUMANITIES

Dance/Film/Video Questionnaire

ACTION

National Student Volunteer Program Training Evaluation

Returned Volunteer Survey

U.S. INTERNATIONAL TRADE COMMISSION

Cast-Iron Cookware, Retailer's Questionnaire

Presurvey Questionnaire to the Producers of Fresh Cut Flowers

Fresh Cut Flower Growers' Questionnaire

Fresh Cut Flower Importers' Questionnaire

Manufacturers' and/or Jobbers' Questionnaire

Producers Questionnaire for Cast-Iron Stoves and Parts of Cast-Iron Stoves Investigation

Importers Questionnaire for Cast-Iron Stoves and Parts of Cast-Iron Stove Investigation

VETERANS ADMINISTRATION

Evaluation of the Outpatient Dental Program

NATIONAL COMMISSION ON THE OBSERVANCE OF INTERNATIONAL WOMENS' YEAR

State Meeting Participant Questionnaire

PERSONNEL NOTES

DEPARTMENT OF COMMERCE

Bureau of Economic Analysis: A. Ray Grimes, formerly with the Office of Regulatory Economics and Policy is now Chief, Regional Economic Analysis Division.

DEPARTMENT OF THE TREASURY

Paul Over has transferred from the Bureau of the Census and promoted to MIS Planning Officer (Math/Stat.).

FEDERAL RESERVE BOARD

Division of Research and Statistics: James R. Wetzel, formerly an Associate Research Division Officer has been promoted to Senior Research Division Officer. Robert Eisenbeis, formerly an assistant to the Director of the Division has been promoted to an Associate Research Division Officer in the Division.

AWARD

Jacob Rabinow of the National Bureau of Standards is this year's recipient of the Harry Diamond Memorial Award presented by the Institute of Electrical and Electronics Engineers, Inc.

SCHEDULE OF RELEASE DATES FOR PRINCIPAL FEDERAL ECONOMIC INDICATORS

June 1977

Release dates scheduled by agencies responsible for the principal economic indicators of the Federal Government are given below. *These are target dates* that will be met in the majority of cases. *Occasionally agencies may be able to release data a day or so earlier or may be forced by unavoidable compilation problems to release a report one or more days later.*

A similar schedule will be shown here each month covering release dates for the following month. The indicators are identified by the title of the releases in which they are included; the source agency; the release identification number where applicable; and the *Business Conditions Digest* series numbers for all BCD series included, shown in parentheses. Release date information for additional series can be found in publications of the sponsoring agencies.

(Any inquiries about these series should be directed to the issuing agency.)

Date		*Subject*	*Date for*
June	1	Construction Expenditures (Press release), Census C-30 (69)	April
	1	Manufacturers' Shipments, Inventories, and Orders, Census, M3-1 (20, 65, 852)	April
	1	Condition Report of Large Commercial Banks, Federal Reserve Board (FRB), H.4.2 (72, 112)	Week Ending May 25
	2	Money Stock Measures, FRB, H.6 (85, 102, 107, 108)	Week Ending May 25
	2	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve Banks, FRB, H.4.1 (93, 94)	Week Ending June 1
	2	Open Market Money Rates and Bond Prices, FRB, G.13	May
	3	Manufacturers' Export Sales and Orders, Census, M4-A	April
	3	Consumer Credit, FRB, G.19 (66, 113)	April
	3	The Employment Situation (Press release), Bureau of Labor Statistics (BLS) (1, 21, 37, 40–44, 91, 340, 441, 442, 444–448, 451-453)	May
	3	Wholesale Price Index (Press release), BLS (330–334)	May

Date		Subject	Date for
June	7	Monthly Wholesale Trade (Press release), Census, BW	April
	7	Plant and Equipment Expenditures, Bureau of Economic Analysis (BEA), (61)	1 Q 77 and 1977
	8	Condition Report of Large Commercial Banks, FRB, H.4.2 (72, 112)	Week Ending June 1
	9	Money Stock Measures, FRB, H.6 (85, 102, 107, 108)	Week Ending June 1
	9	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve Banks, FRB, H.4.1 (93, 94)	Week Ending June 8
	10	Advance Monthly Retail Sales (Press release), Census (54)	May
	13	Quarterly Financial Report for Manufacturing Corporations, Federal Trade Commission	1 Q'77
	15	Yields on FHA Insured New Home 30-year Mortgages, HUD (118)	June 1
	15	Industrial Production and Related Data, FRB, G. 12.3 (47, 73–76)	May
	15	Food Assistance Programs Results, Agriculture	April
	15	Condition Report of Large Commercial Banks, FRB, H.4.2 (72, 112)	Week Ending June 8
	16	Money Stock Measures, FRB, H.6 (85, 102, 107, 108)	Week Ending June 8
	16	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve Banks, FRB, H.4.1 (93, 94)	Week Ending June 15
	16	Manufacturing and Trade: Inventories and Sales, BEA (31, 56, 71)	April
	16	Housing Starts (Press release), Census, C-20 (28, 29)	May
	17	Personal Income, BEA (52, 53)	May
	17	Output, Capacity, and Capacity Utilization, FRB, G.3 (82, 84)	May
	20	Bank Rates on Short-Term Business Loans, FRB, E.2 (67)	May 1–15
	20	Revised Corporate Profits and National Income, BEA	1 Q'77
	21	Advance Report on Durable Goods, Manufacturers' Shipments and Orders (Press release), Census, M3-1 (6, 24, 25, 96, 548)	May
	21	Consumer Price Index (Press release), BLS (320–322)	May
	21	Real Earnings (Press release), BLS (341)	May

Date		Subject	Date for
June	22	Summary of U.S. International Transactions (BEA)	1 Q'77
	22	Condition Report of Large Commercial Banks, FRB, H.4.2 (72, 112)	Week Ending June 15
	23	Money Stock Measures, FRB, H.6 (85, 102, 107, 108)	Week Ending June 15
	23	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve Banks, FRB, H.4.1 (93, 94)	Week Ending June 22
	23	Average Yields of Long-Term Bonds, Treasury Bulletin (115, 116)	April
	27	Export and Import Merchandise Trade, Census, FT-900 (602, 612)	May
	28	Labor Turnover in Manufacturing (Press release), BLS (2, 3, 4)	May
	28	Work Stoppages (Press Release), BLS	May
	29	Composite Indexes of Leading, Coincident, and Lagging Indicators (Press release), BEA	April–May
	29	Condition Report of Large Commercial Banks, FRB, H.4.2 (72, 112)	Week Ending June 22
	30	Money Stock Measures, FRB, H.6 (85, 102, 107, 108)	Week Ending June 22
	30	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve Banks, FRB, H.4.1 (93, 94)	Week Ending June 29
	30	Manufacturers' Shipments, Inventories, and Orders, Census, M3-1 (65)	May
	30	Defense Indicators, Bureau of Economic Analysis (BEA) (525)	May
	30	Agricultural Prices, Agriculture	Mid-June

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